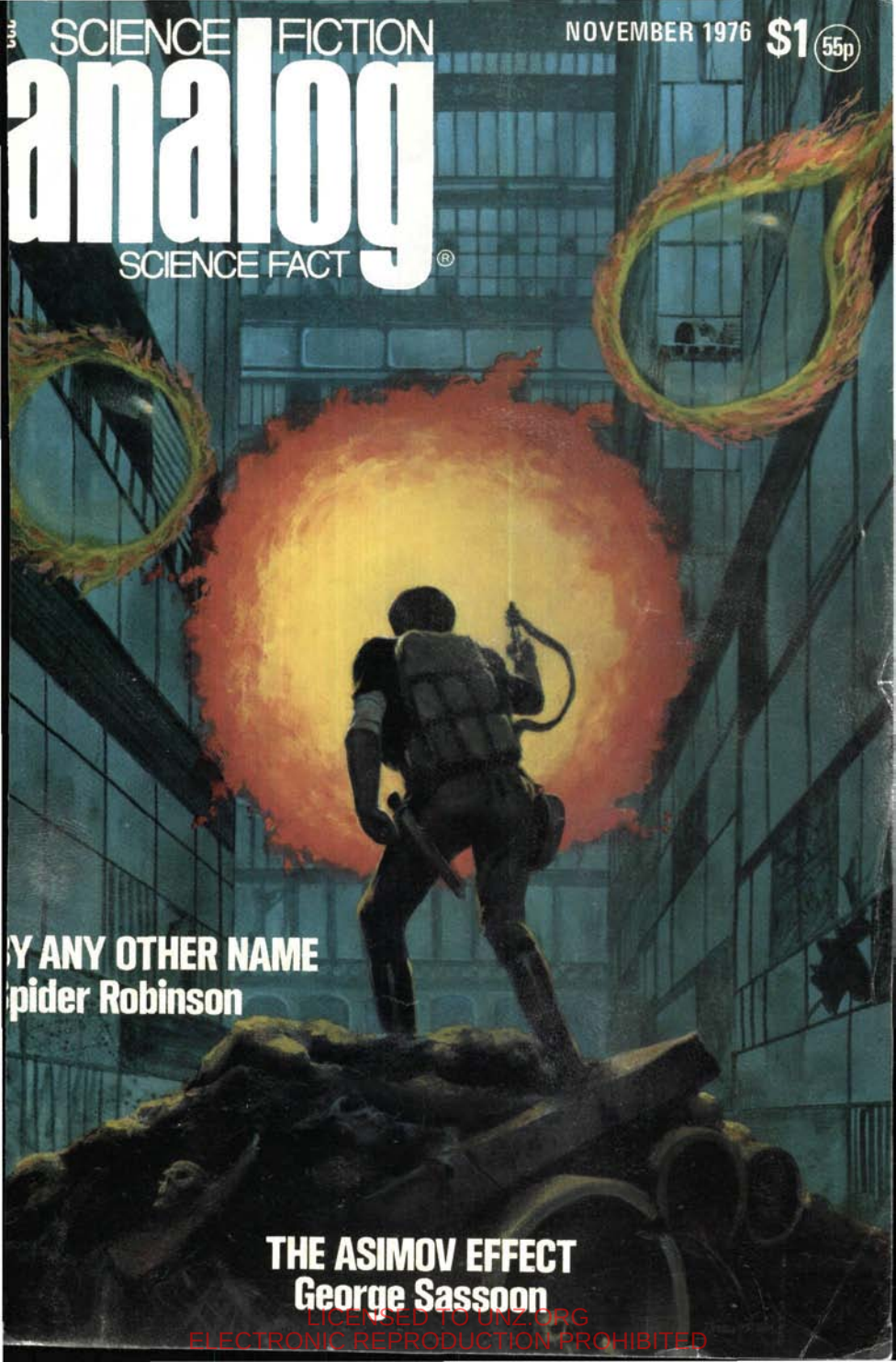

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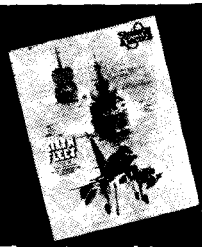

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Guest Editorial

economic scofflaws

Rinehart S. Potts

Rinehart S. Potts teaches library science in the graduate program at Glassboro State College, New Jersey. In his multifaceted career he has been a member of the Glassboro administration (in charge of Federal grants and special projects), and worked in aerial mapping, industrial planning and budget analysis, and has served on school boards in Willingboro and Glassboro. He received a BA in psychology from Temple University, a Master's degree in library science from Rutgers, and is a graduate of the Industrial College of the Armed Forces' course in "Economics of National Security."

We'll learn to break the light barrier before we learn to violate the laws of economics. That little attention-grabber is actually and intentionally misleading; as a longtime reader of SF, I have a high degree of confidence (boosted by the power of positive wishing) that we must and will exceed or somehow evade the speed-of-light limit. But as a longtime reader of economics, I have become more firmly convinced its laws are inviolable.

We're accustomed in SF to denying any limitation on human desires, and like everybody else I've loved reading the literature that came out of that denial. It's generally optimistic and affirms our necessary faith in the human race; it tells us that if we try hard enough, any barrier will fall. I cannot and will not justify the contrary attitude, for without the urge to climb mountains because they're there, we'd still be in the Stone Age.

Unfortunately, and this was brought forcibly home to me in the writing of this piece, and in discussing it with others, anyone who says there are some things we cannot surmount is labeled (at best) a "conservative," which is great if you're addressing the local Chamber of Commerce but lousy if you are talking to SF people. For the record, I deny the label, but go ahead if it makes you feel better.

The trouble is, we haven't differentiated too carefully between situations where it's appropriate, and where it's not appropriate, to set limits to our aims. John Campbell once said (approximately) that the maximum mass of fissionable material you can pile together safely is not subject to discussion or differ-

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ences of opinion, meaning there are some areas where we have no freedom to violate a law.

Yet there *are* cold equations in economics, as in physics. It's just that we need to lay them out for recognition. Robert Heilbroner has said that (oddly enough) in the 19th century, though economics was poorly taught, at least it was recognized to be an important thing for everyone to know, and all educated people made the effort. Today, I find the fastest way to glaze the eyes of a crowd is to mention the word *economics*—no need to even talk about it.

It's time to illustrate this point with an example, lest even the readers of Analog shudder, remember that economics was once called "the dismal science," and turn to the next story.

An unusual situation has arisen in recent years as to the international supply of food grains. Traditionally, the less-developed nations, or less-developed areas of nations, supplied the more advanced nations or areas with food. Almost unnoticed by most Americans, we now have the world's most developed nation, meaning us, supplying so much food to the rest of the world that some experts can plausibly urge we use the grain as blackmail—that we obtain adherence to our policies by pricing and allocation of it, as the Arabs have done so successfully with oil.

Why is the United States in such an enviable position—one we have not quite adjusted to, for some of us still get upset about surplus crops? And, to cite the most prominent example, why is the Soviet Union unable to feed its people in spite of having a majority of them engaged in agriculture? Lack of technology, such as tractors? No, for they have enough tractors and if all had been used efficiently last year, the wheat crop would have been 20 million tons greater—the amount they bought from us in 1972.

Climate? Storage facilities? Undoubtedly problems, but American farmers in the Dakotas are near enough to the Russian climate, and they manage; storage facilities are supplied here when the demand arises. The true culprit is simply Soviet insistence that "capitalistic" economic laws do not exist. For example, this past summer a Soviet economist described the consequences of the pricing system for hogs. There were four different State-set prices being paid to Soviet farmers, not one of which corresponded to the actual costs of production. And meat, of course, is simply the result of feeding grains to animals, so the prices of grains and of meats tend to correlate.

The Soviet government, laudably enough, wished to keep the farmers happy (after having tried to reform them in the thirties by methods more suited to the slaughter of pigs) and thus rigged the meat

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prices paid to farmers at a high level. However, it was not as far above the grain price as that was above the production costs of grain, so millions of farmers solved their own economic equations. They sold the grain to the government at good high prices, then used a part of the proceeds to purchase bread. Now we find that the government, to keep consumers happy, had been subsidizing the price of bread, so it was selling well below the true cost. Naturally enough, the farmers sold expensive grain, bought cheap bread, fed the bread to the animals, and sold high-priced animals to the government.

The Soviets made examples of a few farmers with severe punishments. That's entirely logical, once you've decided that the laws of economics are flexible. The fallacy is that once you depart from selling at a price that reflects true costs, you breed greater problems, including individuals who will unerringly discover the profit opportunities you have provided (though you did so unintentionally).

People *will* play by the rules of the game as you set them up, no matter what you say they are supposed to do. Indeed, any people who failed to follow their own best interests, despite government regulations, could be suspected of mental deficiency. This is so even in the midst of great wars of national self-defense; any government that hopes to mobilize its people effectively in such an emergency must draw up the rules so they help individual interests while serving the common defense. Violation of this principle eventually brings down the whole structure with black markets and fixers.

But those pesky grain sales we made to Russia—of course they raised our cost of living here, so we shouldn't do it again; in fact we shouldn't go on becoming the world's granary. Right? Wrong. An expert in agricultural economics, writing in the Columbia Journalism Review, said recently that the press had misled the American public on this, through the economic ignorance of even the best reporters. L.H. Simerl pointed out that in 1972 our grain stocks were four times what we needed for domestic use—for food plus seed—so the problem was not competition for a scarce commodity, but rather getting rid of an embarrassing surplus. Despite huge grain sales abroad that year, we *still* had a surplus that had to be stored and then subsidized by the government.

He pointed out that the real reasons for rising food prices at home were not grain sales abroad, but increased labor and transportation costs, plus two devaluations of the dollar that raised the prices of imported goods. Simerl lamented that the press itself, and consequently the public, still accepts the "fact" that grain sales abroad raise the

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cost of living here. This is having sizable effects on our foreign policy, for that must have public support, and on domestic politics: just read the speeches of the many contenders for the 1976 Presidency.

Unquestionably it would pay the US to further develop its grain production and make the rest of the world dependent upon us. Whether we will act in our own interests depends on whether enough people understand economics.

The implications for SF writers and readers are clear: it's time to stop writing and reading stories that contain trading systems where backward, agricultural planets supply food to more developed, industrial planets or systems. *Planets full of peasants (or slaves) don't feed anyone but themselves.* On the other hand, a very small farming population, with a high standard of living and education, using sophisticated machinery and techniques and aided by economic rules of the game that are in touch with reality, can easily produce vast quantities of food. It's being done, here and now.

I am not simply making a subtle case for a completely unrestricted economy—one with no government intervention at all—though this is what anyone is suspected of doing when he questions particular interventions. My point, rather, is the need for all of us to become much more cautious in working out the consequences of moves that seem *harmless or even beneficial.* (Remember that one of the rules for writing science fiction is to describe what would happen "if this goes on further . . .")

This leads us into another aspect of economics: what is something worth? Usually we assume pretty automatically that the worth of an item has some correlation with the price paid for it. I suspect such assumptions are built into us from a long-forgotten past, when our cultural clichés were appropriate because life changed little from decade to decade.

Concrete example again: I was one of the first to buy one of those handy pocket calculators. It was quite basic and yet—don't laugh—it cost slightly over a hundred dollars. Obviously I believed it was worth the price at the time. This year the thing broke down and I had to decide whether to get it fixed or buy a new one. That's a routine economic decision all individuals and organizations must make frequently, in all cultures. Rule of thumb, I'm told, is that you spend up to 60% of a thing's value to fix it. That sounds easy enough. Is it therefore worth $60 to fix my old calculator? You already know the answer. I can buy a new one today, as good as my old one, for about twenty dollars—maybe even less when there's a sale on. So the rules of the game say: throw away the old one and buy new. I can't do it. The old one still rests on my desk

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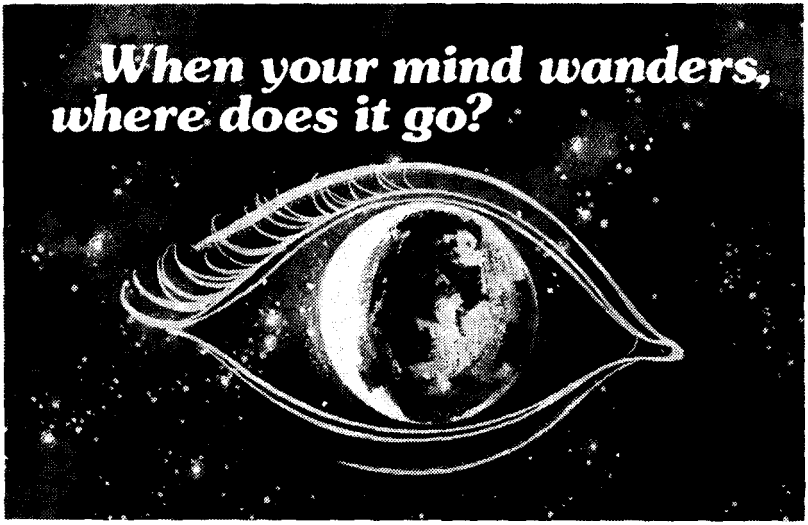

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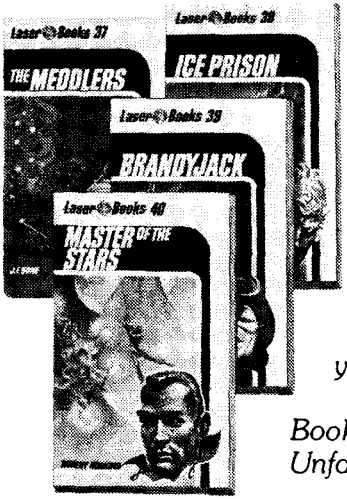

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and a little voice keeps whispering in the back of my head that it would be an awful thing to throw away something that cost so much. Somehow, buying one of the new low-priced ones would be an admission that the old one had lost its value, so it wasn't until this week that I got around to it. For $9.99 plus tax, I now have the very simplest model despite the slightly paranoid feeling that someone snuck in and secretly depreciated the old calculator.

Of course what really happened is that the calculator industry was able to turn out a lower-priced product, and the moment they did so the law of value became noticeable: a thing is worth only what someone will pay for it, regardless of the cost of materials and labor that went into it in excess of current offers. The people who quietly stole the value of my calculator are the ones who developed the electronic calculators of 1975. Now I must force myself to realize that they actually did me a *favor.* They reduced my cost of living. If the cheap calculator had not been developed, I would have paid up to $60 to fix my old one. The wreckage of my old one is essentially worthless, but that is paradoxically no loss to me. Before this strikes you as a simplistic, obvious point, stop and consider carefully whether you have ever reacted similarly.

Now we're ready for *money.* The nature of this strange creature has tangled up some of the best minds in history (and some of the worst, unfortunately) and still does. The poet was right in telling us that "a little learning is a dangerous thing," for as soon as someone realizes "money" is a great deal more than clinking coins or crisp pieces of colored paper, the temptation arises to cure all the world's ills by manipulating money. True enough, tremendous things have been accomplished by such manipulation, but the price paid later (usually by somebody else) is even more tremendous, because only symbols were involved, not reality.

Like the schemes which purport to prove that 0 = 1 after much work with complex equations, these economic schemes sound highly plausible and are difficult to disprove when concocted by clever half-learned people, but they still boil down to making an apparent something by rapidly moving nothing, or something else, from place to place. Each year the Federal Trade Commission and the Post Office stop a small number of promoters from exploiting that deep natural desire we all have to get something for nothing. A rather larger number of people get away with it, and of course those who simply put forward theories for the reform of society through money face no penalty at all.

Mark Twain told us a great deal about money in his "Million Pound Note," which deserves reading if

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you missed it. Two English millionaires give a penniless American such a bank note, to be returned to them in thirty days. The results will settle a bet between them. Of course the American is unable to spend the bank note and the mere fact that he possesses it is at once great pleasure and high frustration. Partly from his own intelligence and partly by accident, he becomes well-to-do without ever giving up the note—ah, the uses of money to make money, once you have enough of it! And what a shame that in real life, Twain so often lost his own money!

It's clear that any quantity of currency, or coins, or entries in a ledger, would be worthless to anyone who is not tied in somehow to the economic system involved. What good are Russian rubles to you, unless someone who is confident he will be able to exchange them (directly or indirectly) for something produced under that economic system is willing to buy them from you? There was a terrific hullabaloo when the US went off the gold standard, and again when it was decided the Treasury would not even try to maintain a gold and silver reserve large enough to "back up" the paper currency. This was because so few people understood that the only real backing to our money is the fact that so many others are tied into our economic system; each of us is glad to receive green pieces of paper because we are confident it can be exchanged easily with millions of people for any material or service. The underlying flimsiness of that confidence only rarely becomes apparent and, with much justification, they used to call the result a "panic."

So. Without getting into economic jargon, my moral is that no person or group is wealthy of himself. Wealth always exists in relation to others—other persons, other nations, other planets if we are talking SF. We cannot accept SF stories which postulate a planet of tremendously rich people because the place is knee-deep in diamonds or such. You can't eat crystallized carbon.

Perhaps you have now drawn the analogy with the newly-rich oil nations. Those gigantic pools of oil on which they float meant nothing until the developed nations applied their expertise—and their investment resources—to extract it, organize the markets, and establish a revolving economic system based on the product. Now there are nations that literally don't know what to do with all the "money" they have (credits accumulated for them in terms of the world economic system). To some extent, they are trading these credits for modern armed forces with which to fight others. Some of the credits are finally going to improve the lot of the average citizen, through purchases of medical and similar ser-

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vices from the developed world. Note the point: without that developed world to trade with, the oil would still be worthless.

In fact, the amounts of "money" being traded to the oil nations have become so great that international bankers have been working at top speed to develop new mechanisms for "recycling" the credits back to us more efficiently and quickly.

Even before the OPEC price multipled, there were some serious proposals to issue SDRs (Special Drawing Rights) and simply give these to the underdeveloped nations. They would use these credits to buy things and services from the developed nations, thus building markets and creating jobs, and more than making up for the apparent give-away. As far as I know, this was never carried beyond first-stage recommendations, though SDRs themselves do exist as a means for trading credits among the developed nations. One objection probably was that the citizens of the developed nations would never have understood their money being "given away." Now, of course, we are paying it more directly to OPEC!

So the only place the oil nations can "spend" their "million pound notes" is with the developed world.

My interest in exploring these issues with Analog readers arose from much correspondence with James Albus, author of "Economics of the Robot Revolution" which appeared in the April 1975 issue. Starting with the unquestioned efficiencies of an automated factory, he described a revised American economic system resting on the kind of financial manipulations I have covered here. His goal was to assure every citizen an annual income, in today's dollars, of about $9,000. By making everyone independent of job needs, the production of more artistic goods and services would be boosted as people did what they liked with their time.

I applaud the goals of abolishing poverty and increasing leisure, but was appalled at the reasoning that lay behind the proposal. A public corporation (which would of course be an arm of the government) would invest great sums annually in American industry in order to enable it to be completely automated. The total profits of that automated industry would be paid out as dividends to all citizens. Where would the money come from to finance this huge new investment, when the problem now is to find enough funds just to keep present-level investment going? Well, Mr. Albus said, it would be obtained from the Federal Reserve system.

I questioned whether he intended such funds to be repaid to the Federal Reserve, and do not have a clear response. Either way, the consequences (remember to always think a few moves ahead) are such

(continued on page 165)

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NOTES TO A SCIENCE FICTION WRITER

BEN BOVA

Straight from the shoulder talk to the short story writer from the Editor of Analog

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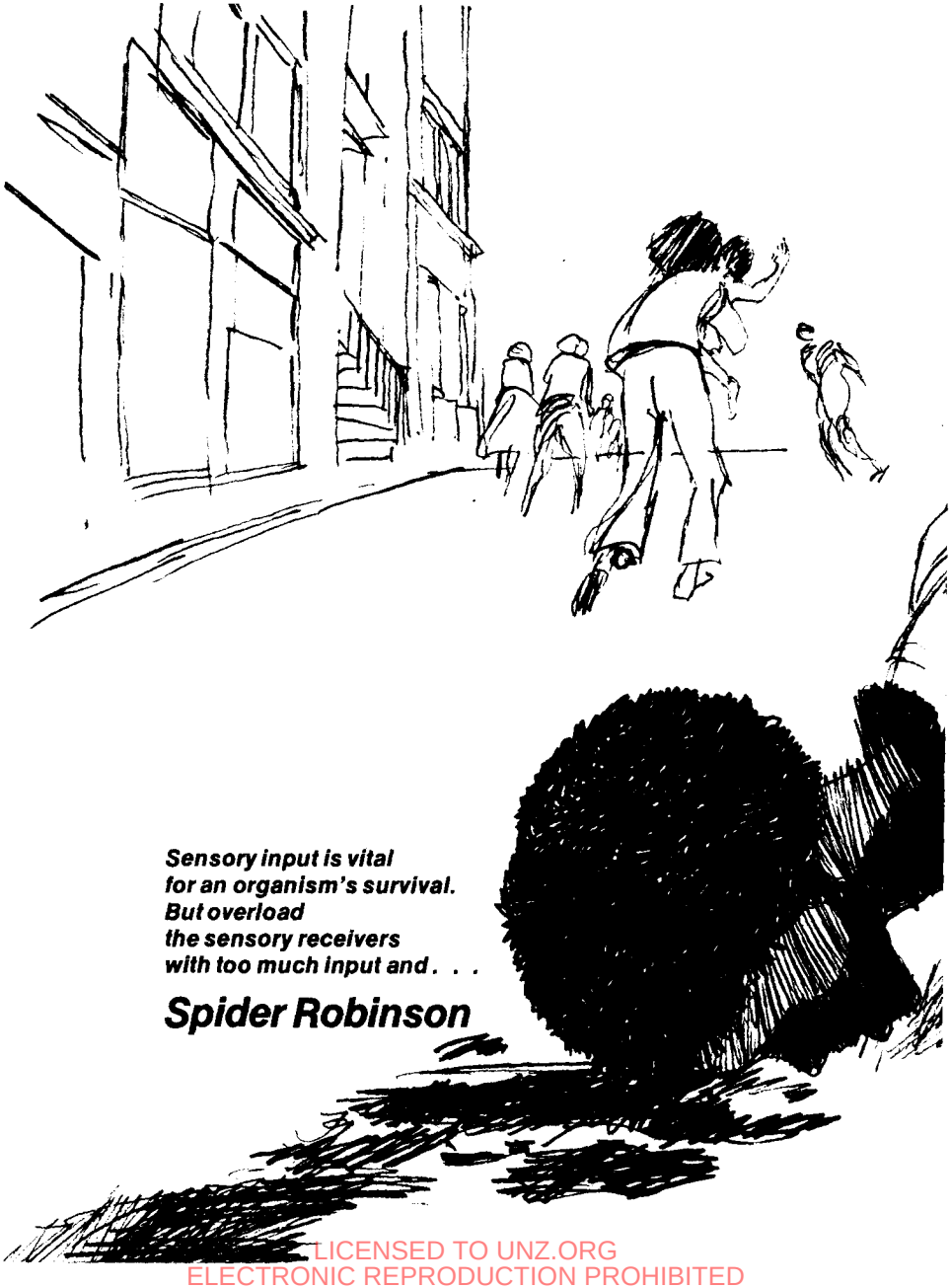

Sensory input is vital
for an organism's survival.
But overload
the sensory receivers
with too much input and . . .

Spider Robinson

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by any other name

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"There's winds out on the ocean
Blowin' wherever they choose.
The winds ain't got no emotion,
babe:
They don't know the blues."
—traditional

CHAPTER ONE

Excerpt from the Journal of Isham Stone

I hadn't meant to shoot the cat.

I hadn't meant to shoot anything, for that matter—the pistol at my hip was strictly defensive armament at the moment. But my adrenals were on overtime and my peripheral vision was straining to meet itself behind my head—when something appeared before me with no warning at all my subconscious sentries opted for the Best Defense. I was down and rolling before I knew I'd fired, through a doorway I hadn't known was there.

I fetched up with a heart-stopping crash against the foot of a staircase just inside the door. The impact dislodged something on the first-floor landing: it rolled heavily down the steps and sprawled across me: the upper portion of a skeleton, largely intact from the sixth vertebra up. As I lurched in horror to my feet, long-dead muscle and cartilage crumbled at last, and random bones skittered across the dusty floor. Three inches above my left elbow, someone was playing a drum-roll with knives.

Cautiously I hooked an eye around the doorframe, at about knee-level. The smashed remains of what had recently been a gray-and-white Persian tom lay against a shattered fire hydrant whose faded red surface was spattered with brighter red and less appealing colors. Overworked imagination produced the odor of singed meat.

I'm as much cat-people as the One-Sleeved Mandarin, and three shocks in quick succession, in the condition I was in, were enough to override all the iron discipline of Collaci's training. Eyes stinging, I stumbled out onto the sidewalk, uttered an unspellable sound, and pumped three slugs into a wrecked '82 Buick lying on its right side across the street.

I was pretty badly rattled—only the third slug hit the exposed gas tank. But it was magnesium, not lead: the car went up with a very satisfactory roar and the prettiest fireball you ever saw. The left rear wheel was blown high in the air; it soared gracefully over my head, bounced off a fourth-floor fire escape and came down flat and hard an inch behind me. Concrete buckled.

When my ears had stopped ringing and my eyes uncrossed, I became aware that I was rigid as a statue. *So much for catharsis,* I thought vaguely, and relaxed with an effort that hurt all over.

The cat was still dead.

I saw almost at once why he had startled me so badly. The tobaccon-

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ist's display window from which he had leaped was completely shattered, so my subconscious sentries had incorrectly tagged it as one of the rare unbroken ones. Therefore, they reasoned, the hurtling object must be in fact emerging from the open door just beyond the window. Anything coming out a doorway that high from the ground just had to be a Musky, and my hand is *much* quicker than my eye.

Now that my eye had caught up, of course, I realized that I couldn't possibly track a Musky by eye. Which was exactly why I'd been keyed up enough to waste irreplaceable ammo and give away my position in the first place. Carlson had certainly made life complicated for me. I hoped I could manage to kill him slowly.

This was no consolation to the cat. I looked down at my Musky-gun, and found myself thinking of the day I got it, just three months past. The first gun I had ever owned myself, symbol of man's estate, *mine* for as long as it took me to kill Carlson, and for as long afterwards as I lived. After my father had presented it to me publicly, and formally charged me with the avenging of the human race, the friends and neighbors—and dark-eyed Alia—had scurried safely inside for the ceremonial banquet. But my father took me aside. We walked in silence through the West Forest to Mama's grave, and through the trees the setting sun over West Mountain looked like a knothole in the wall of Hell. Dad turned to me at last, pride and paternal concern fighting for control of his ebony features, and said, "Isham. . . . Isham, I wasn't much older than you when I got my first gun. That was long ago and far away, in a place called Montgomery—things were different then. But some things never change." He tugged an earlobe reflectively, and continued, "Phil Collaci has taught you well, but sometimes he'd rather shoot first and ask directions later. Isham, you just can't go blazing away indiscriminately. Not *ever.* You hear me?"

The crackling of the fire around the ruined Buick brought me back to the present. Damn, you called it again Dad, I thought as I shivered there on the sidewalk. You *can't* go blazing away indiscriminately.

Not even here in New York City.

It was getting late, and my left arm ached abominably where Grey Brother had marked me—I reminded myself sharply that I was here on business. I had no wish to pass a night in any city, let alone this one, so I continued on up the street, examining every building I passed with extreme care. If Carlson had ears, he now knew someone was in New York, and he might figure out why. I was on his home territory—every alleyway and manhole was a potential ambush.

There were stores and shops of every conceivable kind, commerce

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more fragmented and specialized than I had ever seen before. Some shops dealt only in a *single item.* Some I could make no sense of at all. What the hell is an "rko?"

I kept to the sidewalk where I could. I told myself I was being foolish, that I was no less conspicuous to Carlson or a Musky than if I'd stood on second base at the legendary Shea Stadium, and that the street held no surprise tomcats. But I kept to the sidewalk where I could. I remember Mama—a *long* time ago—telling me not to go in the street or the monsters would get me.

They got her.

Twice I was forced off the curb, once by a subway entrance and once by a supermarket. Dad had seen to it that I had the best plugs Fresh Start had to offer, but they weren't *that* good. Both times I hurried back to the sidewalk and was thoroughly disgusted with my pulse rate. But I never looked over my shoulder. Collaci says there's no sense being scared when it can't help you—and the fiasco with the cat proved him right.

It was early afternoon, and the same sunshine that was warming the forests and fields and workzones of Fresh Start my home seemed to chill the air here, accentuating the barren emptiness of the ruined city. Silence and desolation were all around me as I walked, bleached bones and crumbling brick. Carlson had been efficient, all right, nearly as efficient as the atomic bomb folks used to be so scared of once. It seemed as though I were in some immense Devil's Autoclave, that ignored filth and grime but grimly scrubbed out life of any kind.

Wishful thinking, I decided, and shook my head to banish the fantasy. If the city had been truly lifeless, I'd be approaching Carlson from uptown—I would never have had to detour as far south as the Lincoln Tunnel, and my left arm would not have ached so terribly. Grey Brother is extremely touchy about his territorial rights.

I decided to replace the makeshift dressing over the torn biceps. I didn't like the drumming insistence of the pain: it kept me awake but interfered with my concentration. I ducked into the nearest store that looked defensible, and found myself sprawled on the floor behind an overturned table, wishing mightily that it weren't so flimsy.

Something had moved.

Then I rose sheepishly to my feet, holstering my heater and rapping my subconscious sentries sharply across the knuckles for the second time in half an hour. My own face looked back at me from the grimy mirror that ran along one whole wall, curly black hair in tangles, wide lips stretched back in what looked just like a grin. It wasn't a grin. I hadn't realized how bad I looked.

Dad has told me a lot about Civ-

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ilization, before the Exodus, but I don't suppose I'll ever understand it. A glance around this room raised more questions than it answered. On my left, opposite the long mirror, were a series of smaller mirrors that paralleled it for three-quarters of its length, with odd-looking chairs before them. Something like armchairs made of metal, padded where necessary, with levers to raise and lower them. On my right, below the longer mirror, were a lot of smaller, much plainer wooden chairs, in a tight row broken occasionally by strange frameworks from which lengths of rotting fabric dangled. I could only surmise that this was some sort of arcane narcissist's paradise, where men of large ego would come, remove their clothing, recline in luxuriously upholstered seats, and contemplate their own magnificence. The smaller, shabbier seats, too low to afford a decent view, no doubt represented the cut-rate or second-class accomodations.

But what was the significance of the cabinets between the larger chairs and the wall, laden with bottles and plastic containers and heathen appliances? And why were all the skeletons in the room huddled together in the middle of the floor, as though their last seconds of life had been spent frantically fighting over something?

Something gleamed in the boneheap, and I saw what the poor bas-

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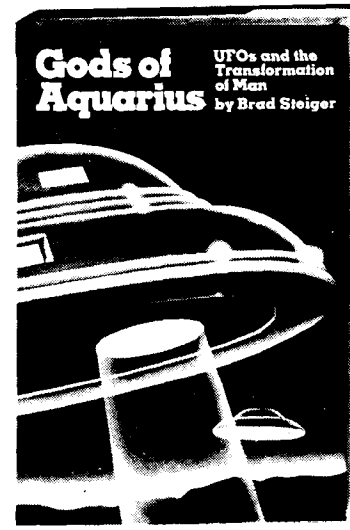

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tards had died fighting for, and knew what kind of place this had been. The contested prize was a straight razor.

My father had spent eighteen of my twenty years telling me why I ought to hate Wendell Carlson, and in the past few days I'd acquired nearly as many reasons of my own. I intended to put them in Carlson's obituary.

A wave of weariness passed over me. I moved to one of the big chairs, pressed gingerly down on the seat to make sure no cunning mechanism awaited my mass to trigger it (Collaci's training again—if Teach' ever gets to Heaven, he'll check it for booby traps), took off my rucksack and sat down. As I unrolled the bandage around my arm I glanced at myself in the mirror and froze, struck with wonder. An infinite series of *me*s stretched out into eternity, endless thousands of Isham Stones caught in that frozen second of time that holds endless thousands of possible futures, on the point of some unimaginable cusp. I knew it was simply the opposed mirrors, the one before me slightly askew, and could have predicted the phenomenon had I thought about it—but I was not expecting it and had never seen anything like it in my life. All at once I was enormously tempted to sit back, light a joint from the first-aid kit in my rucksack, and meditate awhile. I wondered what Alia was doing right now, right at this moment. Hell, I could kill Carlson at twilight, and sleep in his bed—or hole up here and get him tomorrow, or the next day. When I was feeling better.

Then I saw the first image in line. Me. A black man just doesn't bruise spectacularly as a rule, but there was something colorful over my right eye that would do until a bruise came along. I was filthy, I needed a shave, and the long slash running from my left eye to my upper lip looked angry. My black turtleneck was torn in three places that I could see, dirty where it wasn't torn, and bloodstained where it wasn't dirty. It might be a long time before I felt any better than I did right now.

Then I looked down at what was underneath the gauze I'd just peeled off, saw the black streaks on the chocolate brown of my arm, and the temptation to set a spell vanished like an overheated Musky.

I looked closer, and began whistling "Good Morning Heartache" through my teeth very softly. I had no more neosulfa, damned little bandage for that matter, and it looked like I should save what analgesics I had to smoke on the way home. The best thing I could do for myself was to finish up in the city and get gone, find a Healer before my arm rotted.

And all at once that was fine with me. I remembered the two sacred duties that had brought me to New York; one to my father and

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my people, and one to myself. I had nearly died proving to my satisfaction that the latter was impossible; the other would keep me no great long time. New York and I were, as Bierce would say, incompossible.

One way or another, it would all be over soon.

I carefully rebandaged the gangrenous arm, hoisted the rucksack and went back outside, popping a foodtab and a very small dosage of speed as I walked. There's no point in bringing real food to New York—you can't taste it anyway and it masses so damned much.

The sun was perceptibly lower in the sky—the day was in catabolism. I shifted my shoulders to settle the pack and continued on up the street, my eyes straining to decipher faded signs.

Two blocks up I found a shop that had specialized in psychedelia. A '69 Ford shared the display window with several smashed hookahs and a narghile or two. I paused there, sorely tempted again. A load of pipes and papers would be worth a good bit at home; Techno and Agro alike would pay dearly for fine-tooled smoking goods—more evidence that, as Dad is always saying, technology's usefulness has outlasted it.

But that reminded me of my mission again, and I shook my head savagely to drive away the daydreaming that sought to delay me. I was—what was that phrase Dad had used at my arming ceremony?—"The Hand of Man Incarnate," that was it, the product of two years personal combat training and eighteen years of racial hatred. After I finished the job I could rummage around in crumbling deathtraps for hash pipes and roach clips—my last detour had nearly killed me, miles to the north.

But I'd *had* to try. I was only two at the time of the Exodus, too young to retain much but a confused impression of universal terror, of random horror and awful revulsion everywhere. But I remember one incident very clearly. I remember my brother Israfel, all of eight years old, kneeling down in the middle of 116th Street and methodically smashing his head against the pavement. Long after Izzy's eight-year-old brains had splashed the concrete, his little body continued to slam the shattered skull down again and again in a literally mindless spasm of escape. I saw this over my mother's shoulder as she ran, screaming her fear, through the chaotically twisting nightmare that for as long as she could remember had been only a quietly throbbing nightmare; as she ran through Harlem.

Once when I was twelve I watched an Agro slaughter a chicken, and when the headless carcass got up and ran about I heard my mother's scream again. It was coming from my throat. Dad

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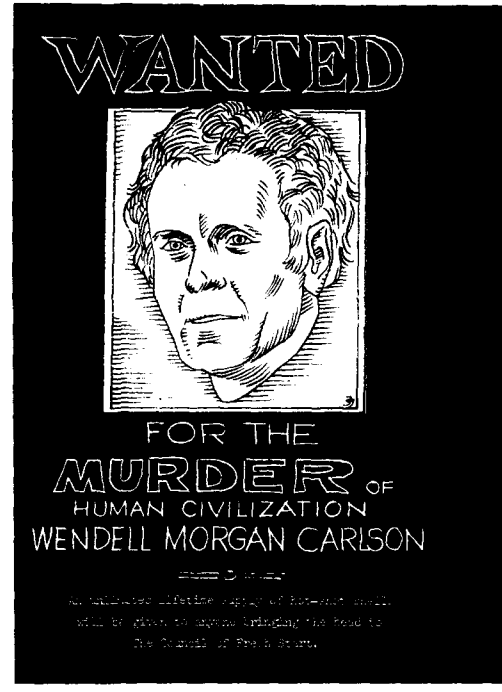
tells me I was unconscious for four days and woke up screaming.

Even here, even downtown, where the bones sprawled everywhere were those of strangers, I was wound up tight enough to burst, and ancient reflex fought with modern wisdom as I felt the irrational impulse to lift my head and cast about for an enemy's scent. I had failed to recover Izzy's small bones; Grey Brother, who had always lived in Harlem, now ruled it, and sharp indeed were his teeth. I had managed to hold off the chittering pack with incendiaries until I reached the Hudson, and they would not cross the bridge to pursue me. And so I lived—at least until gangrene got me.

And the only thing between me and Fresh Start was Carlson. I saw again in my mind's eye the familiar Carlson Poster, the first thing my father ran off when he got access to a mimeograph machine: a remarkably detailed sketch of thin, academic features surrounded by a mass of graying hair, with the legend, "WANTED: FOR THE MURDER OF HUMAN CIVILIZATION—WENDELL MORGAN CARLSON. An unlimited lifetime supply of hot-shot shells will be given to anyone bringing the head to The Council of Fresh Start."

No one ever took Dad up on it—at least, no one who survived to collect. And so it looked like it was up to me to settle the score for a shattered era and a planetful of corpses. The speed was taking hold now; I felt an exalted sense of destiny, and a fever to be about it. I



was the duly chosen instrument for mankind's revenge, and that reckoning was long overdue.

I unclipped one of the remaining incendiary grenades from my belt—it comforted me to hold that much raw power in my hand—and kept on walking uptown, feeling infinitely more than twenty years old. And as I stalked my prey through concrete canyons and brownstone

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foothills, I found myself thinking of his crime, of the twisted motives that had produced this barren jungle and countless hundreds like it. I remembered my father's eyewitness account of Carlson's actions, repeated so many times during my youth that I could almost recite it verbatim, heard again the Genesis of the world I knew from its first historian—my father, Jacob Stone. Yes, *that* Stone, the one man Carlson never expected to survive, to shout across a smashed planet the name of its unknown assassin. Jacob Stone, who first cried the name that became a curse, a blasphemy and a scream of rage in the throats of all humankind. Jacob Stone, who named our betrayer: Wendell Morgan Carlson!

And as I reviewed that grim story, I kept my hand near the rifle with which I hoped to write its happy ending. . . .

CHAPTER TWO

Excerpts from I WORKED WITH CARLSON, *by Jacob Stone, Ph.D., authorized version: Fresh Start Press 1986 (Mimeo).*

. . . The sense of smell is a curious phenomenon, oddly resistant to measurement or rigorous analysis. Each life form on Earth appears to have as much of it as they need to survive, plus a little. The natural human sense of smell, for instance, was always more efficient than most people realized, so much so that in the 1880's the delightfully eccentric Sir Francis Galton had actually succeeded, by associating numbers with certain scents, in *training himself to add and subtract by smell,* apparently just for the intellectual exercise.

But through a sort of neurological suppressor circuit of which next to nothing is known, most people contrived to ignore all but the most pleasing or disturbing of the messages their noses brought them, perhaps by way of reaction to a changing world in which a finely-tuned olfactory apparatus became a nuisance rather than a survival aid. The level of sensitivity which a wolf requires to find food would be a hindrance to a civilized human packed into a city of his fellows.

By 1983, Professor Wendell Morgan Carlson had raised olfactometry to the level of a precise science. In the course of testing the theories of Beck and Miles, Carlson almost absent-mindedly perfected the classic "blast-injection" technique of measuring differential sensitivity in olfaction, *without regard for the subjective impressions of the test subject.* This not only refined his data, but also enabled him to work with life forms other than human, a singular advantage when one considers how much of the human brain is terra incognita.

His first subsequent experiments

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indicated that the average wolf utilized his sense of smell on the order of a thousand times more efficiently than a human. Carlson perceived that wolves lived in a world of scents, as rich and intricate as our human worlds of sight and word. To his surprise, however, he discovered that the *potential* sensitivity of the human olfactory apparatus far outstripped that of any known species.

This intrigued him. . . . .

. . . . . Wendell Morgan Carlson, the greatest biochemist Columbia—and perhaps the world—had ever seen, was living proof of the truism that a genius can be a damned fool outside his own specialty.

Genius he unquestionably was; it was *not* serendipity that brought him the Nobel Prize for isolating a cure for the entire spectrum of virus infections called "the common cold." Rather it was the sort of inspired accident that comes only to those brilliant enough to perceive it, fanatic seekers like Pasteur.

But Pasteur was a boor and a braggart, who frittered away valuable time in childish feuds with men unfit to wash out his test tubes. Genius is seldom a good character reference.

Carlson was a left-wing radical.

Worse, he was the type of radical who dreams of romantic exploits in a celluloid underground: grim-eyed rebels planting homemade bombs, assassinating the bloated oppressors in their very strongholds and (although he certainly knew what hydrogen sulfide was) escaping through the city sewers.

It never occurred to him that it takes a very special kind of man to be a guerilla. He was convinced that the moral indignation he had acquired at Washington in '71 (during his undergraduate days) would see him through hardships and privation, and he would have been horrified if someone had pointed out to him that Che Guevara seldom had access to toilet paper. Never having experienced hunger, he thought it a glamorous state. He lived a compartmentalized life, and his wild talent for biochemistry had the thickest walls: only within them was he capable of logic or true intuition. He had spent a disastrous adolescent year in a seminary, enlisted as a "storm trooper of Mary," and had come out of it apostate but still saddled with a relentless need to Serve A Cause—and it chanced that the cry in 1982 was, once again, "Revolution Now!"

He left the cloistered halls of Columbia in July of that year, and applied to the smaller branch—the so-called "Action-Faction"—of the New Weathermen for a position as assassin. Fortunately he was taken for crazy and thrown out. The African Liberation Front was some-

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what less discerning—they broke his leg in three places. In the Emergency Room of Jacobi Hospital Carlson came to the conclusion that the trouble with Serving A Cause was that it involved associating with unperceptive and dangerously unpredictable people. What he needed was a One-Man Cause.

And then, at the age of thirty-two, his emotions noticed his intellect for the first time.

When the two parts of him came together, they achieved critical mass—and that was a sad day for the world. I myself bear part of the blame for that coming-together—unwittingly I provided one of the final sparks, put forward an idea which sent Carlson on the most dangerous intuitive leap of his life. My own feelings of guilt for this will plague me to my dying day—and yet it might have been anyone. Or no one.

Fresh from a three-year stint doing biowar research for the Defense Department, I was a very minor colleague of Carlson's, but quickly found myself becoming a close friend. Frankly I was flattered that a man of his stature would speak to me, and I suspect Carlson was overjoyed to find a black man who would treat him as an equal.

But for reasons which are very difficult to explain to anyone who did not live through that period—and which need no explanation for those who did—I was reluctant to discuss the ALF with a honky, however "enlightened." And so when I went to visit Carlson in Jacobi Hospital and the conversation turned to the self-defeating nature of uncontrollable rage, I attempted to distract the patient with a hasty change of subject.

"The Movement's turning rancid, Jake," Carlson had just muttered, and an excellent digression occurred to me.

"Wendell," I said heedlessly, "do you realize that you personally are in a position to make this a better world?"

His eyes lit up. "How's that?"

"You are probably the world's greatest authority on olfactometry and the human olfactory apparatus, among other things—right?"

"As far as there is one, I suppose so. What of it?" He shifted uneasily within his traction gear: wearing his radical *persona,* he was made uncomfortable by reference to his scientist-mode. He felt it had little to do with the Realities of Life—like nightsticks and grand juries.

"Has it ever occurred to you," I persisted to my everlasting regret, "that nearly all the undesirable by-products of twentieth-century living, Technological Man's most unlovable aspects, quite literally *stink*? The whole *world*'s going rancid, Wendell, not just the Movement. Automobiles, factory pollu-

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tion, crowded cities—Wendell, why couldn't you develop a selective suppressant for the sense of smell—controlled anosmia? Oh, I know a snort of formaldehyde will do the trick, and having your adenoids removed sometimes works. But a man oughtn't to have to give up the smell of frying bacon just to survive in New York. And you know we're reaching that pass—in the past few years it hasn't been necessary to leave the city and then return to be aware of how evil it smells. The natural suppressor-mechanism in the brain—whatever it is—has gone about as far as it can go. Why don't you devise a small-spectrum filter to aid it? It would be welcomed by sanitation workers, engineers—why, it would be a godsend to the man on the street!"

Carlson was mildly interested. Such an anosmic filter would be both a mordant political statement and a genuine boon to Mankind. He had been vaguely pleased by the success of his cold-cure, and I believe he sincerely wished to make the world a happier place—however perverted his methods tended to be. We discussed the idea at some length, and I left.

Had Carlson not been bored silly in the hospital, he would never have rented a television set. It was extremely unfortunate that the Late Show (ed. note: a television show of the period) on that particular evening featured the film version of Alistair MacLean's *The Satan Bug*. Watching this absurd production, Carlson was intellectually repelled by the notion that a virus could be isolated so hellishly virulent that "a teaspoon of it would sweep the earth of life in a few days."

But it gave him a wild idea—a fancy, a fantasy, and a tasty one.

He checked with me by phone the next day, very casually, and I assured him from my experiences with advances in virus-vectoring that MacLean had *not* been whistling in the dark. In fact, I said, modern so-called "bacterial warfare" made the Satan Bug look like child's play. Carlson thanked me and changed the subject.

On his release from the hospital, he came to my office and asked me to work with him for a full year, to the exclusion of all else, on a project whose nature he was reluctant to discuss. "Why do you need me?" I asked, puzzled.

"Because," he finally told me, "you know how to make a Satan Bug. I intend to make a God Bug. And you could help me."

"Eh?"

"Listen, Jake," he said with that delightful informality of his, "I've licked the common cold—and there are still herds of people with the sniffles. All I could think of to do with the cure was to turn it over to the pharmaceuticals people, and I did all I could to make sure they didn't milk it, but

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there are still suffering folks who can't afford the damned stuff. Well, there's no need for that. Jake, a cold will kill someone sufficiently weakened by hunger—I can't help the hunger, but I could eliminate colds from the planet in forty-eight hours . . . with your help."

"A benevolent virus-vector . . ." I was flabbergasted, as much by the notion of decommercializing medicine as by the specific nostrum involved.

"It'd be a lot of work," Carlson went on. "In its present form my stuff isn't compatible with such a delivery system—I simply wasn't thinking along those lines. But I'll bet it could be made so, with your help. Jake, I haven't got time to learn your field—throw in with me. Those pharmaceuticals goniffs have made me rich enough to pay you twice what Columbia does, and we're both due for sabbatical anyway. What do you say?"

I thought it over, but not enough. The notion of collaborating with a Nobel Prize winner was simply too tempting. "All right, Wendell."

We set up operations in Carlson's laboratory-home on Long Island, he in the basement and myself on the main floor. There we worked like men possessed for the better part of a year, cherishing private dreams and slaughtering guinea pigs by the tens of thousands. Carlson was a stern if somewhat slapdash taskmaster, and as our work progressed he began "looking over my shoulder," learning my field while discouraging inquiries about his own progress. I assumed that he simply knew his field too well to converse intelligently about it with anyone but himself. And yet he absorbed all my own expertise with fluid rapidity, until eventually it seemed that he knew as much about virology as I did myself. One day he disappeared with no explanation, and returned a week or two later with what seemed to me a more nasal voice.

And near the end of the year there came a day when he called me on the telephone. I was spending the weekend, as always, with my wife and two sons in Harlem. Christmas was approaching, and Barbara and I were discussing the relative merits of plastic and natural trees when the phone rang. I was not at all surprised to hear Carlson's reedy voice, so reminiscent of an oboe lately—the only wonder was that he had called during conventional waking hours.

"Jake," he began without preamble, "I haven't the time or inclination to argue, so shut up and listen, right? Right. I advise and strongly urge you to take your family and leave New York *at once*—steal a car if you have to, or hijack a Greyhound (ed. note: a public transportation conveyance)

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for all of me, but be at least twenty miles away by midnight."

"But . . ."

". . . head north if you want my advice, and for God's sake stay away from all cities, towns, and people in any number. If you possibly can, get upwind of all nearby industry, and bring along all the formaldehyde you can—a gun too, if you own one. Goodbye, my friend, and remember I do this for the greater good of mankind. I don't know if you'll understand that, but I hope so."

"Wendell, what in the name of *God* are you . . .?" I was talking to a dead phone.

Barbara was beside me, a worried look on her face, my son Isham in her arms. "What is it?"

"I'm not sure," I said unsteadily, "but I think Wendell has come unhinged. I must go to him. Stay with the children; I'll be back as quickly as I can. And Barbara . . ."

"Yes?"

"I know this sounds insane, but pack a bag and be ready to leave town *at once* if I call and tell you to."

"Leave town? Without you?"

"Yes, just that. Leave New York and never return. I'm virtually certain you won't have to, but it's just possible that Wendell knows what he's talking about. If he does, I'll meet you at the cabin by the lake, as soon as I can." I put off her questions then and left, heading for Long Island.

When I reached Carlson's home in Old Westbury I let myself in with my key and made my way toward his laboratory. But I found him upstairs in mine, perched on a stool, gazing intently at a flask in his right hand. Its interior swirled, changing color as I watched.

Carlson looked up. "You're a damned fool, Jake," he said quietly before I could speak. "I gave you a chance."

"Wendell, what on earth is this all about? My wife is scared half to . . ."

"Remember that controlled anosmia you told me about when I was in the hospital?" he went on conversationally. "You said the trouble with the world is that it stinks, right?"

I stared at him, vaguely recalling my words.

"Well," he said, "I've got a solution."

And Carlson told me what he held in his hand. A single word.

I snapped, just completely snapped. I charged him, clawing wildly for his throat, and he struck me with his left hand, his faceted ring giving me the scar I bear to this day, knocking me unconscious. When I came to my senses I was alone, alone with a helpless guilt that careened yammering through the halls of my reason and a terror that clutched at my bowels. A note lay on the floor beside me, in Wendell's sprawling hand, telling me that I had—by my

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watch—another hour's grace. At once I ran to the phone and wasted ten minutes trying to call Barbara. I could not get through—trunk failure, the operator said. Gibbering, I took all the formaldehyde I could find in both labs and a self-contained breathing rig from Carlson's, stepped out into the streetlit night and set about stealing a car.

It took me twenty minutes, not bad for a first attempt but still cutting it fine—I barely made it to Manhattan, with superb traffic conditions to help me, before the highway became a butcher shop.

At precisely nine o'clock, Wendell Morgan Carlson stood on the roof of Columbia's enormous Butler Library, held high in the air by fake Greek columns and centuries of human thought, gazing north across a quadrangle within which grass and trees had nearly given up trying to grow, toward the vast domed Lowe Library and beyond toward the ghetto in which my wife and children were waiting, oblivious. In his hands he held the flask I had failed to wrest from him, and within it were approximately two teaspoons of an infinitely refined and concentrated virus culture. It was the end result of our year's work, and it duplicated what the military had spent years and billions to obtain: a strain of virus that could blanket the globe in about forty-eight hours. There was no antidote for it, no vaccine, no defense of any kind for virtually all of humanity. It was diabolical, immoral and quite efficient. On the other hand, it was not lethal.

Not that is, in and of itself. But Carlson had concluded, like so many before him, that a few million lives was an acceptable price for saving the world, and so at 9:00 PM on December 17, 1984 he leaned over the parapet of Butler Hall and dropped his flask six long stories to the concrete below. It shattered on impact and sprayed its contents into what dismal breeze still blew through the campus.

Carlson had said one word to me that afternoon, and the word was "Hyperosmia."

Within forty-eight hours every man, woman and child left alive on earth possessed a sense of smell approximately a hundred times more efficient than that of any wolf that ever howled.

During those forty-eight hours, a little less than a fifth of the planet's population perished, by whatever means they could devise, and every city in the world spilled its remaining life into the surrounding countryside. The ancient smell-suppressing system of the human brain collapsed under unbearable demand, overloaded and burned out in an instant.

The great complex behemoth called Modern Civilization ground to a halt in a little less than two

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days. In the last hours, those pitiably few city-dwellers on the far side of the globe who were rigorous enough of thought to heed and believe the brief bewildered death-cries of the great mass media strove valiantly—and hopelessly—to effect emergency measures. The wiser attempted, as I had, to deaden their senses of smell with things like formaldehyde, but there is a limit to the amount of formaldehyde that even desperate men can lay hands on in a day or less, and its effects are generally temporary. Others with less vision opted for airtight environments if they could get them, and there they soon died, either by asphyxiation when their air supply ran out or by suicide when, fervently hoping they had outlived the virus, they cracked their airlocks at last. It was discovered that human technology had produced no commonly-available nose plug worth a damn, nor any air-purification system capable of filtering out Carlson's virus. Although the rest of the animal kingdom was not measurably affected by it, mankind failed utterly to check the effects of the ghastly Hyperosmic Plague, and the Exodus began . . .

. . . I don't believe Carlson rejoiced over the carnage that ensued, though a strict Malthusian might have considered it as a long-overdue pruning. But it is easy to understand why he thought it was necessary, to visualize the "better world" for which he spent so many lives: Cities fallen to ruin. Automobiles rotting where they stood. Heavy industry gone to join the dinosaurs. The synthetic-food industry utterly undone. Perfume what it had always been best—a memory—as well as tobacco. A wave of cleanliness sweeping the globe, and public flatulation at last a criminal offense, punishable by death. Secaucus, New Jersey abandoned to the buzzards. The back-to-nature communalists achieving their apotheosis, helping to feed and instruct bewildered urban survivors (projected catch-phrase: "If you don't like hippies, next time you're hungry, call a cop"). The impetus of desperation forcing new developments in production of power by sun, wind and water rather than inefficient combustion of more precious resources. The long-delayed perfection of plumbing. And a profoundly interesting and far-reaching change in human mating customs as feigned interest or disinterest became unviable pretenses (as any wolf could have told us, the scent of desire can be neither faked nor masked).

All in all an observer as impartial as Carlson imagined himself to be might have predicted that at an ultimate cost of perhaps thirty to forty percent of its population (no great loss), the world ten or twenty

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years after Carlson would be a much nicer place to live in.

Instead and in fact, there are four billion less people living in it, and in this year Two AC we have achieved only a bare possibility of survival at a cost of eighty to ninety percent of our number.

The first thing Carlson could not have expected claimed over a billion and a half lives within the first month of the Brave New World. His compartmentalized mind had not been monitoring current developments in the field of psychology, a discipline he found frustrating. And so he was not aware of the work of Lynch and others, conclusively demonstrating that autism was the result of sensory overload. Autistic children, Lynch had proved, were victims of a physiochemical imbalance which disabled their suppressor-circuitry for sight, hearing, touch, smell, or any combination thereof, flooding their brains with an intolerable avalanche of useless data and shocking them into retreat. Lysergic acid diethylamide is said to produce a similar effect, on a smaller scale.

The Hyperosmic Virus produced a similar effect, on a larger scale. Within weeks, millions of near-catatonic adults and children perished from malnutrition, exposure, or accidental injury. Why some survived the shock and adapted, while some did not, remains a mystery, although there exists scattered data suggesting that those whose sense of smell was already relatively acute suffered most.

The second thing Carlson could not have expected was The War.

The War had been ordained by the plummeting fall of his flask, but he may perhaps be excused for not foreseeing it. It was not such a war as has ever been seen on earth before in all recorded history, humans versus each other or subordinate life forms. There was nothing for the confused, scattered survivors of the Hyperosmic Plague to fight over, few unbusy enough to fight over it; and with lesser life forms we are now *better* equipped to compete. No, war broke out between us bewildered refugees—and the Muskies.

It is difficult for us to imagine today how it was possible for the human race to know of the Muskies for so long without ever believing in them. Countless humans reported contact with Muskies—who at various times were called "ghosts," "poltergeists," "leprechauns," "fairies," "gremlins," and a host of other misleading labels—and not *one* of these thousands of witnesses was believed by humanity at large. Some of us saw our cats stare, transfixed, at nothing at all, and wondered—but did not believe—what they saw. In its arrogance the race assumed that the peculiar perversion of entropy called "life" was the exclusive

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property of solids and liquids.

Even today we know very little about the Muskies, save that they are gaseous in nature and perceptible only by smell. The interested reader may wish to examine Dr. Michael Gowan's groundbreaking attempt at a psychological analysis of these entirely alien creatures, *Riders of the Wind* (Fresh Start Press, 1986).

One thing we do know is that they are capable of an incredible and disturbing playfulness. While not true telepaths, Muskies can project and often impose mood patterns over short distances, and for centuries they seem to have delighted in scaring the daylights out of random humans. Perhaps they laughed like innocent children as women to whom their pranks were attributed were burned at the stake in Salem. Dr. Gowan suggests that this aspect of their racial psyche is truly infantile—he feels their race is still in its infancy. As, perhaps, is our own.

But in their childishness, Muskies can be dangerous both deliberately and involuntarily. Years ago, before the Exodus, people used to wonder why a race that could plan a space station couldn't design a safe airliner—the silly things used to fall out of the sky with appalling regularity. Often it was simply sheer bad engineering, but I suspect that at least as often a careless, drifting Musky, riding the trades lost in God knows what wildly *alien* thoughts, was sucked into the air intake of a hurtling jetliner and burst the engine asunder as it died. It was this guess which led me to theorize that extreme heat might disrupt and kill Muskies, and this gave us our first and so far only weapon in the bitter war that still rages between us and the windriders.

For, like many children, Muskies are dangerously paranoid. Almost at the instant they realized that men could somehow now perceive them directly, they attacked, with a ferocity that bespoke blind panic. They learned quickly how best to kill us: by clamping itself somehow to a man's face and forcing him to breathe it in, a Musky can lay waste to his respiratory system. The only solution under combat conditions is a weapon which fires a projectile hot enough to explode a Musky—and that is a flawed solution. If you fail to burn a Musky in time, before it reaches you, you may be faced with the unpleasant choice of wrecking your lungs or blowing off your face. All too many Faceless Ones roam the land, objects of horror and pity, supported by fellow men uncomfortably aware that it could happen to them tomorrow.

Further, we Technos here at Fresh Start, dedicated to rebuilding at least a minimum technology, must naturally wear our recently-developed nose plugs for long intervals while doing Civilized work.

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We therefore toil in constant fear that at any moment we may feel alien projections of terror and dread, catch even through our plugs the characteristic odor that gives Muskies their name, and gasp our lungs out in the final spasms of death.

God knows how Muskies communicate—or even if they do. Perhaps they simply have some sort of group-mind or hive-mentality. What would evolution select for a race of gas-clouds spinning across the earth on the howling mistral? Someday we may devise a way to take one prisoner and study it; for the present we are content to know that they can be killed. A good Musky is a dead Musky.

Some day we may climb back up the ladder of technological evolution enough to carry the battle to the Muskies' home ground; for the present we are at least becoming formidable defenders.

Some day we may have the time to seek out Wendell Morgan Carlson and present him with a bill; for the present we are satisfied that he dares not show himself outside New York City, where legend has him hiding from the consequences of his actions.

CHAPTER THREE

From the Journal of Isham Stone

. . . but my gestalt of the eighteen years that had brought me on an intersecting course with my father's betrayer was nowhere near as pedantically phrased as the historical accounts Dad had written. In fact, I had refined it down to four words.

God damn you, Carlson!

Nearly mid-afternoon, now. The speed was wearing off; time was short. Broadway got more depressing as I went. Have you ever seen a *bus-full* of skeletons—with pigeons living in it? My arm ached like hell, and a muscle in my thigh had just announced it was sprained—I acquired a slight but increasing limp. The rucksack gained an ounce with every step, and I fancied that my right plug was leaking the barest trifle around the flange. I couldn't say I felt first-rate.

I kept walking north.

I came to Columbus Circle, turned on a whim into Central Park. It was an enclave of life in this concrete land of death, and I could not pass it by—even though my intellect warned that I might encounter a Doberman who hadn't seen a can of dog food in twenty years.

The Exodus had been good to this place at least—it was lush with vegetation now that swarming humans no longer smothered its natural urge to be alive. Elms and oaks reached for the clouds with the same optimism of the maples and birches around Fresh Start, and the overgrown grasses were the green-

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est things I had seen in New York. And yet—in places the grass was dead, and there were dead bushes and shrubs scattered here and there. Perhaps first impressions were deceiving—perhaps a small parcel of land surrounded by an enormous concrete crypt was not a viable ecology after all. Then again, perhaps neither was Fresh Start.

I was getting depressed again.

I pocketed the grenade I still held and sat down on a park bench, telling myself that a rest would do wonders for my limp. After a time static bits of scenery moved—the place was alive. There were cats, and gaunt starved dogs of various breeds, apparently none old enough to know what a man was. I found their confidence refreshing—like I say, I'm a peaceful type assassin. Gregarious as hell.

I glanced about, wondering why so many of the comparatively few human skeletons here had been carrying weapons on the night of the Exodus—why go armed in a park? Then I heard a cough and looked around, and for a crazy second I thought I knew.

A leopard.

I recognized it from pictures in Dad's books, and I knew what it was and what it could do. But my adrenaline system was tired of putting my gun in my fist—I sat perfectly still and concentrated on smelling friendly. My hand-weapon was designed for high temperature,

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not stopping-power; grenades are ineffective against a moving target; and I was leaning back against my rifle—but that isn't why I sat still. I had learned that day that lashing out is not an optimum response to fear.

And so I took enough of a second look to realize that this leopard was incredibly ancient, hollow-bellied and claw-scarred, more noble than formidable. If wild game had been permitted to roam Central Park, Dad would have told me—he knew my planned route. Yet this cat seemed old enough to predate the Exodus. I was certain he knew me for a man. I suppose he had escaped from a zoo in the confusion of the time, or perhaps he was some rich person's pet. I understand they had such things in the Old Days. Seems to me a leopard'd be more trouble than an eagle—Dad kept one for four years and I never had so much grief over livestock before or since. Dad used to say it was the symbol of something great that had died, but I thought it was ornery.

This old cat seemed friendly enough, though, now that I noticed. He looked patriarchal and wise, and he looked awful hungry if it came to that. I made a gambler's decision for no reason that I can name. Slipping off my rucksack slowly and deliberately, I got out a few foodtabs, took four steps toward the leopard and sat on my heels, holding out the tablets.

Instinct, memory or intuition, the big cat recognized my intent and loped my way without haste. Somehow the closer he got the less scared I got, until he was nuzzling my hand with a maw that could have amputated it. I *know* the foodtabs didn't smell like anything, let alone food, but he understood in some empathic way what I was offering—or perhaps he felt the symbolic irony of two ancient antagonists, black man and leopard, meeting in New York City to share food. He ate them all, without nipping my fingers. His tongue was startlingly rough and rasping, but I didn't flinch, or need to. When he was done he made a noise that was a cross between a cough and a snore and butted my leg with his head.

He was old, but powerful; I rocked backward and fell off my heels. I landed correctly, of course, but I didn't get back up again. My strength left me and I lay there gazing at the underside of the park bench.

For the first time since I entered New York, I had communicated with a living thing and been answered in kind, and somehow that knowledge took my strength from me. I sprawled on the turf and waited for the ground to stop heaving, astonished to discover how weak I was and in how many places I hurt unbearably. I said some words that Collaci had taught me, and they helped some but not

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enough. The speed had worn off faster than it should have, and there was no more.

It looked like it was time for a smoke. I argued with myself as I reached overhead to get the first-aid kit from the rucksack, but I saw no alternative. Carlson was not a trained fighter, had never had a teacher like Collaci: I could take him buzzed. And I might not get to my feet any other way.

The joint I selected was needle-slender—more than a little cannabis would do me more harm than good. I had no mind to get wrecked in *this* city. I lit up with my coil lighter and took a deep lungful, held it as long as I could. Halfway through the second toke the leaves dancing overhead began to sparkle, and my weariness got harder to locate. By the third I knew of it only by hearsay, and the last hit began melting the pains of my body as warm water melts snow. Nature's own analgesic, gift of the earth.

I started thinking about the leopard, who was lying down himself now, washing his haunches. He was magnificent in decay—something about his eyes said that he intended to live forever or die trying. He was the only one of his kind in his universe, and I could certainly identify with that—I'd always felt different from the other cats myself.

And yet—I was kin to those who had trapped him, caged him, exhibited him to the curious and then abandoned him to die half a world away from his home. Why wasn't he trying to kill me? In his place I might have acted differently . . .

With the clarity of smoke-logic I followed the thought through. At one time the leopard's ancestors had tried to kill mine, and *eat* them, and yet there was no reason for me to hate *him*. Killing him wouldn't help my ancestors. Killing me would accomplish nothing for the leopard, make his existence no easier . . . except by a day's meal, and I had given him that.

What then, I thought uneasily, *will my killing Carlson accomplish?* It could not put the Hyperosmic Virus back in the flask, nor save the life of any now living. Why come all this way to kill?

It was not, of course, a new thought. The question had arisen several times during my training in survival and combat. Collaci insisted on debating philosophy while he was working you over, and expected reply; he maintained that a man who couldn't hold up his end of the conversation while fighting for his life would never make a really effective killer. You could pause for thought, but if he decided you were just hoarding your wind he stopped pulling his punches.

One day we had no special topic, and I voiced my self-doubts about the mission I was training for. What good, I asked Collaci, would

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killing Carlson do? Teach' disengaged and stood back, breathing a little hard, and grinned his infrequent wolf's grin.

"Survival has strange permutations, Isham. Revenge is a uniquely human attribute—somehow we find it easier to bury our dead when we have avenged them. We have many dead." He selected a toothpick, stuck it into his grin. "And for your father's sake it has to be you who does it—only if his son provides his expiation can Dr. Stone grant himself absolution. Otherwise I'd go kill that silly bastard myself." And without warning, he had tried, unsuccessfully, to break my collarbone.

And so now I sat tired, hungry, wounded and a little stoned in the middle of an enormous island mausoleum, asking myself the question I had next asked Collaci, while trying—unsuccessfully—to cave in his rib cage: is it moral or ethical to kill a man?

Across the months his answer came back: *Perhaps not, but it is sometimes necessary.*

And with that thought my strength came to me and I got to my feet. My thoughts were as slick as wet soap, within reach but skittering out of my grasp. I grabbed one from the tangle and welded it to me savagely: *I will kill Wendell Morgan Carlson.* It was enough.

And saying good-bye to the luckier leopard, who could never be hagridden by ancient ghosts, I left the park and continued on up Broadway, as alert and deadly as I knew how to be.

When I reached 114th Street, I looked above the rooftops, and there it was: a thin column of smoke north and a little east, toward Amsterdam Avenue. Legend and my father's intuition had been right. Carlson was holed up where he had always felt most secure—the academic womb-bag of Columbia. I felt a grin pry my face open. It would all be over soon now, and I could go back to being me—whoever that was.

I left the rucksack under a station wagon and considered my situation. I had three tracers left in my Musky-killing handgun, three incendiary grenades clipped to my belt, and the scope-sighted sniper-rifle with which I planned to kill Carlson. The latter held a full clip of eight man-killing slugs—seven more than I needed. I checked the action and jacked a slug into the chamber.

There was a detailed map of the Morningside Campus in my pack but I didn't bother to get it out—I had its twin brother in my head. Although neither Teach' nor I had entirely shared Dad's certainty that Carlson would be at Columbia, I had spent hours studying the campus maps he gave me as thoroughly as the New York City street maps that Collaci had provided. It seemed the only direct contribution

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Dad could make to my mission.

It looked as though his effort had paid off.

I wondered whether Carlson was expecting me. I wasn't sure if the sound of the car I'd shot downtown could have traveled this far, nor whether an explosion in a city full of untended gas mains was unusual enough to put Carlson on his guard. Therefore I had to assume that it could have and it was. Other men had come to New York to deal with Carlson, as independents, and none had returned.

My mind was clicking efficiently now, all confusion gone. I was eager. A car-swiped lamppost leaned drunkenly against a building, and I briefly considered taking to the rooftops for maximum surprise factor. But rooftops are prime Musky territory, and besides I didn't have strength for climbing.

I entered the campus at the southwest, through the 115th Street gate. As my father had predicted, it was locked—only the main gates at 116th had been left open at night in those days, and it was late at night when Carlson dropped his flask. But the lock was a simple Series 10 American that might have made Teach' laugh out loud. I didn't laugh out loud. It yielded to the second pick I tried, and I slipped through the barred iron gate without a sound—having thought to oil the hinges first.

A flight of steps led to a short flagstone walkway, gray speckled hexagons in mosaic, a waist-high wall on either side. The walkway ran between Furnald and Ferris Booth Halls and, I knew, opened onto the great inner quadrangle of Columbia. Leaves lay scattered all about, and trees of all kinds thrashed in the lusty afternoon breeze, their leaves a million green pinwheels.

I hugged the right wall until it abutted a taller perpendicular wall. Easing around that, I found myself before the great smashed glass and stone facade of Ferris Booth Hall, the student activities center, staring past it toward Butler Library, which I was seeing from the west side. There was a good deal of heavy construction equipment in the way—one of the many student groups that had occupied space in Booth had managed to blow up itself and a sizable portion of the building in 1983, and rebuilding had still been in progress on Exodus Day. A massive crane stood before the ruined structure, surrounded by stacks of brick and pipe, a bulldozer, storage shacks, a few trucks, a two-hundred-gallon gasoline tank and a pair of construction trailers.

But my eyes looked past all the conventional hardware to a curious device beyond them, directly in front of Butler Library and nearly hidden by overgrown hedges. I couldn't have named it—it looked like an octopus making love to a console stereo—but it obviously

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didn't come with the landscaping. Dad's second intuition was also correct: Carlson was using Butler for his base of operations. God knew what the device was for, but a man without his adenoids in a city full of Muskies and hungry German shepherds would not have built it further from home than could be helped. This was the place.

I drew in a great chest- and belly-full of air, and my grin hurt my cheeks. I held up my rifle and watched my hands. Rock steady.

Carlson, you murdering bastard, I thought, *this is it. The human race has found you, and its Hand is near. A few more breaths and you die violently, old man, like a harmless cat in a smokeshop window, like an eight-year-old boy on a Harlem sidewalk, like a planetwide civilization you thought you could improve on. Get you ready.*

I moved forward.

Wendell Morgan Carlson stepped out between the big shattered lamps that bracketed Butler Hall's front entrance. I saw him plainly in profile, features memorized from the Carlson Poster and my father's sketches, recognizable in the afternoon light even through white beard and tangled hair. He glanced my way, flinched, and ducked back inside a split second ahead of my first shot.

Determined to nail him before he could reach a weapon and dig in, I put my head down and ran, flat out, for the greatest killer of all time.

And the first Musky struck.

Terror sleeted through my brain, driving out the rage, and something warm and intangible plastered itself across my face. I think I screamed then, but somehow I kept from inhaling as I fell and rolled, dropping the rifle and tearing uselessly at the thing on my face. The last thing I saw before invisible gases seared my vision was the huge crane beside me on the right, its long arm flung at the sky like a signpost to Heaven. Then the world shimmered and faded, and I clawed my pistol from its holster. I aimed without seeing, my finger spasmed, and the gun bucked in my hand.

The massive gasoline drum between me and the crane went up with a *whoom,* and I sobbed in relief as I heaved to my feet and dove headlong through the flames. The Musky's dying projections tore at my mind and I rolled clear, searing my lungs with a convulsive inhalation as the Musky exploded behind me. Even as I smashed into the fender of the crane, my hindbrain screamed *Muskies never travel alone!* and before I knew what I was doing I tore loose my plugs to locate my enemy.

Foul stenches smashed my sanity, noxious odors wrenched at my reason. I was torn, blasted, overwhelmed in abominable ordure. The universe was offal, and the world I saw was remote and un-

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real. My eyes saw the campus, but told me nothing of the rank flavor of putrefaction that lay upon it. They saw sky, but spoke nothing of the reeking layers of indescribable decay of which it was made. Even allowing for a greenhouse effect it was much worse than it should have been after twenty years, just as legend had said. I tasted excrement, I tasted metal, I tasted the flavor of the world's largest charnel house, population seven millions, and I writhed on the concrete. Forgotten childhood memories of the Exodus burst in my brain and reduced me to a screaming, whimpering child. I couldn't *stand* it, it was unbearable, *how had I walked, arrogant and unknowing, through this stinking hell all day?*

And with that thought I remembered why I had come here, and knew I could not join Izzy in the peaceful, fragrant dark. I could not let go—I had to kill Carlson before I let the blackness claim me. Courage flowed from God knows where, feeding on black hatred and the terrible fear that I would let my people down, let my father down. I stood up and inhaled sharply, through my nose.

The nightmare world sprang into focus and time came to a halt.

There were six Muskies, skittering about before Butler as they sought to bend the breezes to their will.

I had three hot-shot shells and three grenades.

One steadied, banked my way. I fired from the hip and he flared out of existence.

A second caught hold of a prevailing current and came in like an express train. Panic tore through my mind, and I laughed and aimed and the Musky went incandescent.

Two came in at once then, like balloons in slow motion. I extrapolated their courses, pulled two grenades and armed them with opposing thumbs, counted to four and hurled them together as Collaci had taught me, aiming for a spot just short of my target. They kissed at that spot and rebounded, each toward an oncoming Musky. But one grenade went up before the other, killing its Musky but knocking the other one safely clear. It shot past my ear as I threw myself sideways.

Three Muskies. One slug, one grenade.

The one that had been spared sailed around the crane in a wide, graceful arc and came in low and fast, rising for my face as one of its brothers attacked from my left. Cursing, I burned the latter and flipped backwards through a great trail of burning gas from the tank I'd spoiled. The Musky failed to check in time, shot suddenly skyward and burst spectacularly. I slammed against a stack of twelve-inch pipe and heard ribs crack.

One Musky. One grenade.

As I staggered erect, beating at my smouldering turtleneck, Carlson

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re-emerged from Butler, a curious helmet over his flowing white hair.

I no longer cared about the remaining Musky. Almost absentmindedly I tossed my last grenade in its direction to keep it occupied, but I knew I would have all the time I needed. Imminent death was now a side issue. I lunged and rolled, came up with the rifle in my hands and aimed for the O in Carlson's scraggly white beard. Dimly I saw him plugging a wire from his helmet into the strange console-device, but it didn't matter, it just didn't matter at all. My finger tightened on the trigger.

And then something smashed me on the side of the neck behind the ear, and my finger clenched, and the blackness that had been waiting patiently for oh! so long swarmed in and washed away the pain and the hate and the weariness and oh God the awful smell. . . .

CHAPTER FOUR

Excerpts from the Building of Fresh Start, by Jacob Stone, Ph.D., authorized version, Fresh Start Press, 2001.

Although Fresh Start grew slowly and apparently randomly as personnel and materials became available, its development followed the basic outline of a master plan conceived within a year of the Exodus. Of course, I had not the training or experience to visualize specifics of my dream at that early stage—but the basic layout was inherent in the shape of the landscape and in the nature of the new world Carlson had made for us all.

Five years prior to the Exodus, a man named Gallipolis had acquired title, by devious means, to a logged out area some distance northwest of New York City. It was an isolated two-hundred-acre parcel of an extremely odd shape. Seen from the air it must have resembled an enormous pair of green sunglasses: two valleys choking with new growth, separated physically by a great perpendicular extrusion of the eastern mountain range, almost to the western slopes, leaving the north and south valleys joined only by a narrow channel. The perpendicular "nose" between the valley "lenses" was a tall, rocky ridge, sharply sloped on both sides, forming a perfect natural division. The land dropped gently away from the foot of this ridge in either direction, and dirt roads left by the loggers cut great loops through both valleys. The land was utterly unsuited for farming, and too many miles from nowhere for suburban development—it was what real estate brokers called "an investment in the future."

Gallipolis was a mad Greek. Mad Greeks in literature are invariably swarthy, undereducated, poor and drunk. Gallipolis was flo-

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rid, superbly educated, moderately well-off and a teetotaler. He looked upon his valleys and he smiled a mad smile and decided to hell with the future. He had a serviceable road cut through the north forest past the lake, to a lonely stretch of state highway which fed into the nearby Interstate. He brought bulldozers down this road and had six widely-spaced acres cleared west of the logging road loop in the north valley, and a seventh acre on the lakeshore for himself. On these sites he built large and extremely comfortable homes, masterpieces of design which combined an appearance of "roughing it" with every imaginable modern convenience. He piped in water from spring-fed streams high on the slopes of The Nose (as he had come to call the central ridge). He built beach houses along the lakeshore. It was his plan to lease the homes to wealthy men as weekend or summer homes at an exorbitant fee, and use the proceeds to develop three similar sites in both valleys. He envisioned an ultimate two or three dozen homes and an early retirement, but the only two things he ultimately achieved were to go broke before a single home had been leased and to drop dead.

A nephew inherited the land—and the staggering tax bill. He chanced to be a student of mine, and was aware that I was in the market for a weekend haven from the rigors of the city; he approached me. Although the place was an absurdly long drive from New York, I went up with him one Saturday, looked over the house nearest the lake, made him a firm offer of a quarter of his asking price, and closed the deal on the spot. It was a beautiful place. My wife and I became quite fond of it, and never missed an opportunity to steal a weekend there. Before long we had neighbors, but we seldom saw them, save occasionally at the lake. We had all come there for a bit of solitude, and it was quite a big lake—none of us were socially inclined.

It was for this wooded retreat that my family and I made in the horrible hours of the Exodus, and only by the grace of God did we make it. Certainly none of the other tenants did, then or ever, and it must be assumed that they perished. Sarwar Krishnamurti, a chemist at Columbia who had been an occasional weekend guest at Stone Manor, remembered the place in his time of need and showed up almost at once, with his family. He was followed a few days later by George Dalhousie, a friend of mine from the Engineering Department to whom I had once given directions to the place.

We made them as welcome as we could under the circumstances—my wife was in a virtual state of shock from the loss of our

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eldest son, and none of us were in much better shape. I know we three men found enormous comfort in each other's presence, in having other men of science with whom to share our horror, our astonishment, our guesses and our grim extrapolations. It kept us sane, kept our minds on practical matters, on survival; for had we been alone, we might have succumbed, as did so many, to a numb, traumatized disinterest in living.

Instead, we survived the winter that came, the one that killed so many, and by spring we had laid our plans.

We made occasional abortive forays into the outside world, gathering information from wandering survivors. All media save rumor had perished; even my international-band radio was silent. On these expeditions we were always careful to conceal the existence and location of our home base, pretending to be as disorganized and homeless as the aimless drifters we continually encountered. We came to know every surviving farmer in the surrounding area, and established friendly relations with them by working for them in exchange for food. Like all men, we avoided areas of previous urbanization, for nose plugs were inferior in those days, and Muskies were omnipresent and terrifying. In fact, rumor claimed, they tended to cluster in cities and towns.

But that first spring, we conquered our fear and revulsion with great difficulty and began raiding small towns and industrial parks with a borrowed wagon. We found that rumor had been correct: urban areas were crawling with Muskies. But we needed tools and equipment of all kinds and descriptions, badly enough to risk our lives repeatedly for them. It went slowly, but Dalhousie had his priorities right, and soon we were ready.

We opened our first factory that spring, on a hand-cleared site in the south valley (which we christened "Southtown"). Our first product had been given careful thought, and we chose well—if for the wrong reasons. We anticipated difficulty in convincing people to buy goods from us with barter, when they could just as easily have scavenged from the abandoned urban areas. In fact, one of our central reasons for founding Fresh Start had been the conviction that the lice on a corpse are not a going concern: we did not want our brother survivors to remain dependent on a finite supply of tools, equipment and processed food. If we could risk Musky attack, so could others.

Consequently we selected as our first product an item unobtainable anywhere else, and utterly necessary in the changed world: effective nose plugs. I suggested them; Krishnamurti designed them

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and the primitive assembly line on which they were first turned out, and Dalhousie directed us all in their construction. All of us, men and women, worked on the line. It took us several months to achieve success, and by that time we were our own best customers—our factory smelled most abominable. Which we had expected, and planned for: the whole concept of Fresh Start rested on the single crucial fact that prevailing winds were virtually always from the north. On the rare occasions when the wind backed, The Nose formed a satisfactory natural barrier.

Once we were ready to offer our plugs for sale, we began advertising and recruiting on a large scale. Word of our plans was circulated by word of mouth, mimeographed flyer and shortwave broadcast. The only person who responded by the onset of winter was Helen Phinney, but her arrival was providential, freeing us almost overnight from dependence on stinking gasoline-powered generators for power. She was then and is now Fresh Start's only resident world-class genius, a recognized expert on what were then called "alternative" power sources—the only ones Carlson had left us. She quite naturally became a part of the planning process, as well as a warm friend of us all. Within a short time the malodorous generators had been replaced by water power from the streams that cascade like copious tears from the "bridge" of The Nose, and ultimately by methane gas and wind power from a series of "egg-beater" type windmills strung along The Nose itself. In recent years the generators have been put back on the line, largely for industrial use—but they no longer burn gasoline, nor does the single truck we have restored to service. Thanks to Phinney, they burn pure grain alcohol which we distill ourselves from field corn and rye, which works *more* efficiently than gasoline and produces only water and carbon dioxide as exhaust. (Pre-Exodus man could have used the same fuel in most of his internal combustion engines—but once Henry Ford made his choice, the industry he incidentally created tended of course to perpetuate itself.)

This then was the Council of Fresh Start, assembled by fate; myself, a dreamer, racked with guilt and seeking a truly worthwhile penance, trying to salvage some of the world I'd helped ruin. Krishnamurti, utterly practical wizard at both requirements analysis and design engineering, translator of ideas into plans. Dalhousie, the ultimate foreman, gifted at reducing any project to its component parts and accomplishing them with minimum time and effort. Phinney, the energy provider, devoted to drawing free power from the natural processes of the universe. Our

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personalities blended as well as our skills, and by that second spring we were a unit: The Council. I would suggest a thing, Krishnamurti would design the black box, Dalhousie would build it and Phinney would throw power to it. We fit. Together we felt *useful* again, more than scavenging survivors.

No other recruits arrived during the winter, which like the one before was unusually harsh for that part of the world (perhaps owing to the sudden drastic decline in the worldwide production of waste heat), but by spring volunteers began arriving in droves. We got all kinds: scientists, technicians, students, mechanics, handymen, construction workers, factory hands, a random assortment of men seeking Civilized work. A colony of canvas tents grew in Northtown, in cleared areas we hoped would one day hold great dormitories. Our initial efforts that summer were aimed at providing water, power and sewage systems for our growing community, and enlarging our nose plug factory. A combination smithy-repair-shop-motor-pool grew of its own accord next to the factory in Southtown, and we began bartering repair work for food with local farmers to the east and northwest.

By common consent, all food, tools and other resources were shared equally by all members of the community, with the single exception of mad Gallipolis's summer homes. We the Council members retained these homes, and have never been begrudged them by our followers (two of the homes were incomplete at the time of the Exodus, and remained so for another few years). That aside, all the inhabitants of Fresh Start stand or fall, eat or starve together. The Council's authority as governing committee has never in all the ensuing years been either confirmed or seriously challenged. The nearly one hundred technicians who have by now assembled to our call continue to follow our advice because it works: because it gives their lives direction and meaning, because it makes their hard-won skills useful again, because it pays them well to do what they do best, and thought they might never do again.

During that second summer we were frequently attacked by Muskies, invariably (of course) from the north, and suffered significant losses. For instance, Samuel Pegorski, the young hydraulic engineering major who with Phinney designed and perfected our plumbing and sewage systems, was cut down by the windriders before he lived to hear the first toilet flush in Northtown.

But with the timely arrival of Phillip Collaci, an ex-Marine and former police chief from Pennsylvania, our security problems dis-

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appeared. A preternaturally effective fighting man, Collaci undertook to recruit, organize and train The Guard, comprising enough armed men to keep the northern perimeter of Fresh Start patrolled at all times. At first, these Guards did no more than sound an alarm if they smelled Muskies coming across the lake, whereupon all hands made for the nearest shelter and tried to blank their minds to the semitelepathic creatures.

But Collaci was not satisfied. He wanted an offensive weapon—or, failing that, a defense better than flight. He told me as much several times, and finally I put aside administrative worries and went to work on the problem from a biochemical standpoint.

It seemed to me that extreme heat should work, but the problem was to devise a delivery system. Early experiments with a salvaged flamethrower were unsatisfactory—the cone of fire tended to brush Muskies out of its path instead of consuming them. Collaci suggested a line of alcohol-burning jets along the north perimeter, ready to guard Fresh Start with a wall of flame, an idea which has since been implemented—but at the time we could not spare the corn or rye to make the alcohol to power the jets. Finally, weeks of research led to the successful development of "hot-shot"—ammunition which could be fired from any existing heavy-calibre weapon after its barrel had been replaced, that would ignite as it cleared the modified barrel and generate enormous heat as it flew, punching through any Musky it encountered and destroying it instantly. An early mixture of magnesium and perchlorate of potash has since given way to an even slower-burning mix of aluminum powder and potassium permanganate which will probably remain standard until the last Musky has been slain (long-range plans for long-range artillery shot will have to wait until we can find a good cheap source of cerium, zirconium or thorium—unlikely in the near future). Hot-shot's effective range approximates that of a man's nose on a still day—good enough for personal combat. This turned out to be the single most important advance since the Exodus, not only for mankind, but for the fledgling community of Fresh Start.

Because our only major misjudgement had been the climate of social opinion in which we expected to find ourselves. I said earlier that we feared people would scavenge from cities rather than buy from us, even in the face of terrible danger from the Muskies who prowled the urban skies. This turned out not to be the case.

Mostly, people preferred to do without.

Secure in our retreat, we had misjudged the *zeitgeist,* the mind

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of the common man. It was Collaci, fresh from over a year of wandering up and down the desolate eastern seaboard, who showed us our error. He made us realize that Lot was probably more eager to return to Gomorrah than the average human was to return to his cities and suburbs. Cities had been the scenes of the greatest racial trauma since The Flood, the places where friends and loved ones had died horribly and the skies had filled with Muskies. The Exodus and the subsequent weeks of horror were universally seen as the Hammer of God falling on the *idea of city* itself, and hard-core urbanites who might have debated the point were mostly too dead to do so. The back-to-nature movement, already in full swing at the moment when Carlson dropped the flask, took on the stature and fervor of a Dionysian religion.

Fortunately, Collaci made us see in time that we would inevitably share in the superstition and hatred accorded to cities, become associated in the common mind with the evil-smelling steel-and-glass behemoth from which men had been so conclusively vomited. He made us realize something of the extent of the suspicion and intolerance we would incur—not ignored for our redundance, but loathed for our repugnance.

At Collaci's suggestion Krishnamurti enlisted the aid of some of the more substantial farmers in neighboring regions to the east, northeast and northwest. He negotiated agreements by which farmers who supported us with food received preferential access to Musky-killing ammunition, equipment maintenance and, one day (he promised), commercial power. I could never have sold the idea myself—while I have always understood public relations well from the theoretical standpoint, I have never been very successful in interpersonal diplomacy—at least, with non-technicals. The dour Krishnamurti might have seemed an even more unlikely choice—but his utter practicality convinced many a skeptical farmer where charm might have failed.

Krishnamurti's negotiations not only assured us a dependable supply of food (and incidentally, milled lumber), it had the invaluable secondary effect of gaining us psychological allies, non-Technos who were economically and emotionally committed to us.

Work progressed rapidly once our recruiting efforts began to pay off, and by our fifth year the Fresh Start of today was visible, at least in skeleton form. We had cut interior roads to supplement the northern and southern loops left by gyppo loggers two decades before; three dormitories were up and a fourth a-building; our "General Store" was a growing commercial concern; a line of wind-

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mills was taking shape along the central ridge of The Nose; our sewage plant/methane converter was nearly completed; plans were underway to establish a hospital and to blast a tunnel through The Nose to link North- and Southtowns; "The Tool Shed," the depot which housed irreplaceable equipment and tools, was nearly full; and Southtown was more malodorous than ever, with a large fuel distillery, a chemistry lab, a primitive foundry, and glass-blowing, match-making and weaving operations adjoining the hot-shot and nose-plug factories.

Despite these outward signs of prosperity, we led a precarious existence—there was strong public sentiment in favor of burning us to the ground, at least among the surviving humans who remained landless nomads. To combat this we were running and distributing a small mimeographed newspaper, *Got News,* and maintaining radio station WFS (then and now the only one in the world). In addition Krishnamurti and I made endless public relations trips for miles in every direction to explain our existence and purpose to groups and individuals.

But there were many who had no land, no homes, no families, nothing but a vast heritage of bitterness. These were the precursors of today's so-called Agro Party. Surviving where and as they could, socialized for an environment that no longer existed, they hated us for reminding them of the technological womb which had unforgivably thrust them out. They raided us, singly and in loosely-organized groups, often with unreasonable, suicidal fury. From humanitarian concerns as much as from public relations considerations, I sharply restrained Guard Chief Collaci, whose own inclination was to shoot any saboteur he apprehended—wherever possible they were captured and turned loose outside city limits. Collaci argued strongly for deterrent violence, but I was determined to show our neighbors that Fresh Start bore ill will to no man, and overruled him.

In that fifth year, however, I was myself overruled.

Collaci and his wife Karen (a tough, quiet, redheaded woman) had been given one of Gallipolis's uncompleted cabins, the one furthest and most isolated from Northtown's residential area. A volunteer house-raising had finished it off handsomely the previous spring. It was either bad judgment or ignorance that brought the seven-man raiding party past the Collaci home on their way to blow up the Tool Shed. But it was unquestionably bad judgment that made them kidnap Karen Collaci when they blundered across her in the forest. She was diabetic, and they had no insulin.

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Collaci left his duties without authorization and pursued them, found her body within a few days. He tracked the seven guerillas over a period of a week. Although they had split up and fled in different directions, those seven days sufficed him. He exacted from them penalties which can not be repeated here, left each nailed to a tree, and upon his return to Fresh Start slept for three consecutive days.

Collaci's understandably impulsive action seems, in the light of history, to have been more correct than my own policy of tolerance. At any rate, we have never been raided since.

With the advent of Dr. Michael Gowan, a former professor of psychology from Stony Brook who undertook to create and administrate an educational system, all the necessary seeds had, to my mind, been planted. Barring catastrophe, technological man now could and would survive. Someday, perhaps, he might rebuild what had been destroyed.

And then, one day in 1999, I interviewed and "hired" a new arrival named Jordan Washington. Since then . . .

CHAPTER FIVE

". . . and when I came to, Carlson was dead with a slug through the head and the last Musky was nowhere in smell. So I reset my plugs, found the campfire behind the hedges and ate his supper, and then left the next morning. I found a Healer in Jersey. That's all there is, Dad."

My father chewed the pipe he had not smoked in eighteen years and stared into the fire. Dry poplar and green birch together produced a steady blaze that warmed the spacious living room and peopled it with leaping shadows.

"Then it's over," he said at last, and heaved a great sigh.

"Yes, Dad. It's over."

He was silent, his coal-black features impassive, for a long time. Firelight danced among the valleys and crevices of his patriarch's face, and across the sharp scar on his left cheek (so like the one I now bore). His eyes glittered like rainy midnight. I wondered what he was thinking, after all these years and all that he had seen.

"Isham," he said at last, "you have done well."

"Have I, Dad?"

"Eh?"

"I just can't seem to get it straight in my mind. I guess I expected tangling with Carlson to be a kind of solution, to some things that have been bugging me all my life. Somehow I expected pulling that trigger to bring me peace. Instead I'm more confused than ever. Surely you can smell my unease, Dad? Or are your plugs still in again?" Dad used the best

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plugs in Fresh Start, entirely internal, and he perpetually forgot to remove them after work. Even those who loved him agreed he was the picture of the absent-minded professor.

"No," he said hesitantly. "I can smell that you are uneasy, but I can't smell *why*. You must tell me, Isham."

"It's not easy to explain, Dad. I can't seem to find the words. Look, I wrote out a kind of journal of events in Jersey, while the Healer was working on me, and afterwards while I rested up. It's the same story I just told you, but somehow on paper I think it conveys more of what's bothering me. Will you read it?"

He nodded. "If you wish."

I gave my father all the preceding manuscript, right up to the moment I pulled the trigger and blacked out, and brought him his glasses. He read it slowly and carefully, pausing now and again to gaze distantly into the flames. While he read, I unobtrusively fed the fire and immersed myself in the familiar smells of woodsmoke and ink and chemicals and the pines outside, all the thousand indefinable scents that tried to tell me I was home.

When Dad was done reading, he closed his eyes and nodded slowly for a time. Then he turned to me and regarded me with troubled eyes. "You've left out the ending," he said.

"Because I'm not sure how I feel about it."

He steepled his fingers. "What is it that troubles you, Isham?"

"Dad," I said earnestly, "Carlson is the first man I ever killed. That's . . . not a small thing. As it happens I didn't actually see my bullet blow off the back of his skull, and sometimes it's hard to believe in my gut that I really did it–I know it seemed unreal when I saw him afterward. But in fact I have killed a man. And as you just read, that may be necessary sometimes, but I'm not sure it's right. I *know* all that Carlson did, to us Stones and to the world, I know the guilt he bore. But I must ask you: Dad, was I *right* to kill him? Did he deserve to die?"

He came to me then and gripped my shoulder, and we stood like black iron statues before the raving fire. He locked eyes with me. "Perhaps you should ask your mother, Isham. Or your brother Israfel. Perhaps you should have asked the people whose remains you stepped over to kill Carlson. I do not know what is 'right' and 'wrong'; they are slippery terms to define. I only know what is. And revenge, as Collaci told you, *is* a uniquely human attribute.

"Superstitious Agro guerillas used to raid us from time to time, and because we were reluctant to fire on them they got away with it. Then one day they captured Col-

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laci's wife, not knowing she was diabetic. By the time he caught up with them she was dead of lack of insulin. Within seven days, every guerilla in that raiding party had died, and Fresh Start has not been raided in all the years since, for all Jordan's rhetoric. Ask Collaci about vengeance."

"But Jordan's Agros hate us more than ever."

"But they buy our axheads and wheels, our sulfa and our cloth, just like their more sensible neighbors, and they leave us alone. Carlson's death will be an eternal warning to any who would impose their values on the world at large, and an eternal comfort to those who were robbed by him of the best of their lives—of their homes and their loved ones.

"Isham, you . . . did . . . *right.* Don't ever think differently, son. You did right, and I am deeply proud of you. Your mother and Israfel are resting easier now, and millions more too. I know that I will sleep easier tonight than I have in eighteen years."

That's right, Dad, you will. I relaxed. "All right, Dad. I guess you're right. I just wanted to hear someone tell me besides myself. I wanted *you* to tell me." He smiled and nodded and sat down again, and I left him there, an old man lost in his thoughts.

I went to the bathroom and closed the door behind me, glad that restored plumbing had been one of Fresh Start's first priorities to be realized. I spent a few minutes assembling some items I had brought back from New York City and removing the back of the septic tank behind the toilet bowl. Then I flushed the toilet.

Reaching into the tank I grabbed the gravity ball and flexed it horizontal so that the tank would not refill with water. Holding it in place awkwardly, I made a long arm and picked up the large bottle of chlorine bleach I had fetched from the city. As an irreplaceable relic of Civilization it was priceless—and utterly useless to modern man. I slipped my plugs into place and filled the tank with bleach, replacing the porcelain cover silently but leaving it slightly ajar. I bent again and grabbed a large canister—also a valuable but useless antique—of bathroom bowl cleaner. It was labeled "Vanish," and I hoped the label was prophetic. I poured the entire canister into the bowl.

Hang the expense, I thought, and giggled insanely.

Then I put the cover down on the seat, hid the bleach and bowl cleaner and left, whistling softly through my teeth.

I felt good, better than I had since I left New York.

I walked through inky dark to the lake, and I sat among the pines by the shore, flinging stones at the water, trying to make them skip. I couldn't seem to get it right. I was used to the balancing effect of

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a left arm. I rubbed my stump ruefully and lay back and just thought for awhile. I had lied to my father—it was not over. But it would be soon.

Right or wrong, I thought, removing my plugs and lighting a joint, *it sure can be necessary.*

Moonlight shattered on the branches overhead and lay in shards on the ground. I breathed deep of the cool darkness, tasted pot and woods and distant animals and the good crisp scents of a balanced ecology, heard the faraway hum of wind-generators storing power for the work yet to be done. And I thought of a man gone mad with a dream of a better, simpler world; a man who, Heaven help him, meant well. And I thought of the tape recording I planned to leave behind me, explaining what I had done to The Council and the world.

CHAPTER SIX

Transcript of a Tape Recording Made by Isham Stone (Fresh Start Judicial Archives).

I might as well address this tape to you, Collaci—I'll bet my Musky-gun that you're the first one to notice and play it. I hope you'll listen to it as well, but that might be too much to ask, the first time around. Just keep playing it.

The story goes back a couple of months, to when I was in the city. By now you've no doubt found my journal, with its account of my day in New York, and you've probably noticed the missing ending. Well, there are two endings to that story. There's the ending I told my father, and then there's the one you're about to hear. The true one.

I drifted in the darkness for a thousand years, helpless as a Musky in a hurricane, caroming off the inside of my skull. Memories swept by like drifting blimps, and I clutched at them as I sailed past, but the ones tangible enough to grasp burned my fingers. Vaguely, I sensed distant daylight on either side, decided those must be my ears and tried to steer for the right one, which seemed a bit closer. I singed my arm banking off an adolescent trauma, but it did the trick—I sailed out into daylight and landed on my face with a hell of a crash. I thought about getting up, but I couldn't remember whether I'd brought my legs with me, and they weren't talking. My arm hurt even more than my face, and something stank.

"Help?" I suggested faintly, and a pair of hands got me by the armpits. I rose in the air and closed my eyes against a sudden wave of vertigo. When it passed, I decided I was on my back in the bed I had just contrived to fall out of. High in my chest, a dull but insistent pain advised me to breathe shallowly.

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I'll be damned, I thought weakly. *Collaci must have come along to back me up without telling me. Canny old son of a bitch, I should have thought to pick him up some toothpicks.*

"Hey, Teach'," I croaked, and opened my eyes.

Wendell Morgan Carlson leaned over me, concern in his gaze.

Curiously enough, I didn't try to reach up and crush his larynx. I closed my eyes, relaxed all over, counted to ten very slowly, shook my head to clear it and opened my eyes again. Carlson was still there.

Then I tried to reach up and crush his larynx. I failed, of course, not so much because I was too weak to *reach* his larynx as because only one arm even acknowledged the command. My brain said that my left arm was straining upwards for Carlson's throat, and complaining like hell about it too, but I didn't see the arm anywhere. I looked down and saw the neatly bandaged stump and lifted it up absently to see if my arm was underneath it and it wasn't. It dawned on me then that the stump was all the left arm I was ever going to find, and whacko: I was back inside my skull, safe in the friendly dark, ricocheting off smouldering recollections again.

The second time I woke up was completely different. One minute I was wrestling with a phantom, and then a switch was thrown and I was lucid. *Play for time* was my first thought, *the tactical situation sucks.* I opened my eyes.

Carlson was nowhere in sight. Or smell—but then my plugs were back in place.

I looked around the room. It was a room. Four walls, ceiling, floor, the bed I was in and assorted ugly furniture. Not a weapon in sight, nor anything I could make one from. A look out the window in the opposite wall confirmed my guess that I was in Butler Hall, apparently on the ground floor, not far from the main entrance. The great curved dome of Lowe "Library" was nearly centered in the windowframe, its great stone steps partly obscured by overgrown shrubbery in front of Butler. The shadows said it was morning, getting on toward noon. I closed my eyes, firmly.

Next I took stock of myself. My head throbbed a good deal, but it was easily drowned out by the ache in my chest. Unquestionably some ribs had broken, and it felt as though the ends were mismatched. But as near as I could tell the lung was intact—it didn't hurt more when I inhaled. Not much more, anyway. My legs both moved when I asked them to, with a minimum of backtalk, and the ankles appeared sound. No need to open my eyes again, was there?

I stopped the inventory for a moment. In the back of my skull a clawed lizard yammered for re-

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lease, and I devoted a few minutes to reinforcing the walls of its prison. When I could no longer hear the shrieking, I switched on my eyes again and quite dispassionately considered the stump on my left arm.

It looked like a good, clean job. The placement of the cut said it was a surgical procedure rather than the vengeful hostility I'd assumed first—it seemed as though the gangrene had been beaten. *Oh fine,* I thought, *a benevolent madman I have to kill.* Then I was ashamed. My mother had been benevolent, as I remembered her; and Israfel never got much chance to be anything. All men knew Carlson's intentions had been good. I could kill him with one hand.

I wondered where he was.

A fly buzzed mournfully around the room. Hedges rustled outside the window, and somewhere birds sang, breathless trills that hung sparkling on the morning air. It was a beautiful day, just warm enough to be comfortable, no clouds evident, just enough breeze and the best part of the day yet to come. It made me want to go down by the stream and poke frogs with a stick, or go pick strawberries for Mr. Fletcher, red-stained hands and a bellyful of sweet and the trots next morning. It was a great day for an assassination.

I thought about it, considered the possibilities. Carlson was . . . . . somewhere. I was weaker than a Musky in a pressure cooker and my most basic armament was down by twenty-five percent. I was on unfamiliar territory, and the only objects in the room meaty enough to constitute weaponry were too heavy for me to lift. Break the windowpane and acquire a knife? How would I hold it? My sneakers were in sight across the room, under a chair holding the rest of my clothes, and I wondered if I could hide behind the door until Carlson entered, then strangle him with the laces.

I brought up short. How was I going to strangle Carlson with one hand?

Things swam then for a bit, as I got the first of an endless series of flashes of just how drastically my life was altered now by the loss of my arm. *You'll never use a chainsaw again, or a shovel, or a catcher's mitt, or. . . .*

I buried the lizard again and forced myself to concentrate. Perhaps I could fashion a noose from my sneaker laces. With one hand? *Could* I? Maybe if I fastened one end of the lace to something, then looped the other end around his neck and pulled? I needn't be strong, it could be arranged so that my weight did the killing. . . . .

Just in that one little instant I think I decided not to die, decided to keep on living with one arm, and the question never really arose in my mind again. I was too busy to despair, and by the time I could

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afford to--much later--the urge was gone.

All of my tentative plans, therapeutic as they were, hinged on one important question: could I stand up? It seemed essential to find out.

Until then I had moved only my eyes--now I tried sitting up. It was no harder than juggling bulldozers, and I managed to cut the scream down to an explosive, "Uh *huh!*" My ribs felt like glass, broken glass ripping through the muscle sheathing and pleural tissue. Sweat broke out on my forehead and I fought down dizziness and nausea, savagely commanding my body to obey me like a desperate rider digging spurs into a dying horse. I locked my right arm behind me and leaned on it, swaying but upright, and waited for the room to stop spinning. I spent the time counting to one thousand by eighths. Finally it stopped, leaving me with the feeling that a stiff breeze could start it spinning again.

All right then. *Let's get this show on the road, Stone.* I swung a leg over the side of the bed, discovered with relief that my foot reached the floor. That would make it easier to balance upright on the edge of the bed before attempting to stand. Before I could lose my nerve I swung the other leg over, pushed off with my arm, and was sitting upright. The floor was an incredible distance below--had I really fallen that far and lived? Perhaps I should just wait for Carlson to return, get him to come close and sink my teeth into his jugular.

I stood up.

A staggering crescendo in the symphony of pain, ribs still carrying the melody. I locked my knees and tottered, moaning piteously like a kitten trapped on a cornice. It was the closest I could come to stealthy silence, and all things considered it was pretty damn close. My right shoulder was discernibly heavier than the left one, and it played hob with my balance. The floor, which had been steadily receding, was now so far away I stopped worrying about it--surely there would be time for the 'chute to open.

Well then, why not try a step or two?

My left leg was as light as a helium balloon--once peeled off the floor it tried to head for the ceiling, and it took an enormous effort to force it down again. The right leg fared no better. Then the room started spinning again, just as I'd feared, and it was suddenly impossible to keep either leg beneath my body, which began losing altitude rapidly. The 'chute didn't open. There was a jarring crash, and a ghastly *bounce.* Many pretty lights appeared, and one of the screams fenced in behind closed teeth managed to break loose. The pretty lights gave way to flaking ceiling, and the ceiling gave way to blackness. I remembered a line from an old song Doctor Mike used to sing,

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something about ". . . roadmaps in a well-cracked ceiling . . ." and wished I'd had time to read the map. . . . .

I came out of it almost at once, I think. It *felt* as though the room was still spinning, but I was now spinning with it at the same velocity. By great good fortune I had toppled backward, across the bed. I took a tentative breath, and it still felt like my lung was intact. I was drenched with sweat, and I seemed to be lying on someone's rock collection.

Okay, I decided, *if you're too weak to kill Carlson now, pretend you're even weaker. Get back under the sheets and play dead, until your position improves.* Isham Machiavelli, that's me. You'd've been proud of me, Teach'.

The rock collection turned out to be wrinkled sheets. Getting turned around and back to where I'd started was easier than reeling a whale into a rowboat, and I had enough strength to arrange the sheets plausibly before all my muscles turned into peanut butter. Then I just lay there breathing as shallowly as I could manage, wondering why my left . . . . . why my stump didn't seem to hurt enough. I hated to look a gift horse in the mouth; the psychological burden was quite heavy enough, thanks. But it made me uneasy.

I began composing a square-dance tune in time to the throbbing of my ribs. The room reeled to it, slightly out of synch at first but then so rhythmically that it actually seemed to stumble when the snare-drummer out in the hall muffed a paradiddle. The music stopped, but the drummer staggered on off-rhythm, faint at first but getting louder. Footsteps.

It had to be Carlson.

He was making a hell of a racket. Feverishly I envisioned him dragging a bazooka into the room and lining it up on me. Crazy. A flyswatter would have more than sufficed. But what the hell *was* he carrying then?

The answer came through the doorway: a large carton filled with things that clanked and rattled. Close behind it came Wendell Morgan Carlson himself, and it was as well that the square-dance music had stopped—the acceleration of my pulse would have made the tune undanceable. My nostrils tried to flare around the plugs, and the hair on the back of my neck might have bristled in atavistic reflex if there hadn't been a thousand pounds of head lying on it.

The Enemy!

He had no weapons visible. He looked much older than his picture on the Carlson Poster—but the craggy brow, thin pinched nose and high cheeks were unmistakable, even if the lantern jaw was obscured by an inordinate amount of gray beard. He was a bit taller than I had pictured him, with more hair and narrower shoulders. I hadn't

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expected the pot belly. He wore baggy jeans and a plaid flannel shirt, both ineptly patched here and there, and a pair of black sandals.

His face held more intelligence than I like in an antagonist—he would not be easy to fool. *Wendell* who? *Never heard of him. Just got back from Pellucidar myself, and I was wondering if you could tell me where all the people went? Sorry I took a shot at you, and oh yeah, thanks for cutting off my arm; you're a brick.*

He put the carton down on an ancient brown desk, crushing a faded photograph of someone's children, turned at once to meet my gaze and said an incredible thing.

"I'm sorry I woke you."

I don't know what I'd expected. But in the few fevered moments I'd had to prepare myself for this moment, my first exchange of words with Wendell Morgan Carlson, I had never imagined such an opening gambit. I had no riposte prepared.

"You're welcome," I croaked insanely, and tried to smile. Whatever it was I actually did seemed to upset him; his face took on that look of concern I had glimpsed once before—when? Yesterday? *How long had I been here?*

"I'm glad you are awake," he went on obligingly. "You've been unconscious for nearly a week." No wonder I felt constructed-of-inferior-materials. I decided I must be a pretty tough mothafucka. It was nice to know I wasn't copping out.

"What's in the box?" I asked, with a little less fuzz-tone.

"Box?" He looked down. "Oh yes, I thought . . . you see, it's intravenous feeding equipment. I studied the literature, and I . . ." he trailed off. His voice was a reedy but pleasant alto, with rusting brass edges. He appeared unfamiliar with its use.

"You were going to . . ." An ice cube formed in my bowels. Needle into sleeping arm, suck my life from a tube; have a hit of old Isham. *Steady boy, steady.*

"Perhaps it might still be a good idea," he mused. "All I have to offer you at the moment is bread and milk. Not real milk of course . . . . . but then you could have honey with the bread. I suppose that's as good as glucose."

"Fine with me, Doctor," I said hastily. "I have a thing about needles." And other sharp instruments. "But where do you get your honey?"

He frowned quizzically. "How did you know I have a Ph.D.?"

Think quick. "I didn't. I assumed you were a Healer. It was you who amputated my arm?" I kept my voice even.

His frown deepened, a striking expression on that craggy face. "Young man," he said reluctantly, "I have no formal medical training of any sort. Perhaps your arm could have stayed on—but it

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seemed to me . . ." He was, to my astonishment, mortally embarrassed.

"Doctor, it needed extensive cutting the last time I saw it, and I'm sure it got worse while I was under. Don't . . . . . worry about it. I'm sure you did the best you could." If he was inclined to forget my attempt to blow his head off, who was *I* to hold a grudge? Let bygones be bygones—I didn't need a new reason to kill him.

"I read all I could find on field amputation," he went on, still apologetic, "but of course I'd never done one before." On anything smaller than a race, I assured him that it looked to me like a textbook job. It was inexpressibly weird to have this man seek my pardon for saving my life when I planned to take his at the earliest possible opportunity. It upset me, made me irritable. My wounds provided a convenient distraction, and I moved enough to justify a moan.

Carlson was instantly solicitous. From his cardboard carton he produced a paper package which, torn open, revealed a plastic syringe. Taking a stoppered jar from the carton, he drew off a small amount of clear fluid.

"What's that?" I said, trying to keep the suspicion from my voice.

"Demerol."

I shook my head. "No thanks, Doc. I told you I don't like needles."

He nodded, put down the spike and took another object from the carton. "Here's oral demerol, then. I'll leave it where you can reach it." He put it on a bedside table. I picked up the jar, gave it a quick glance. It said it was demerol. I could not break the seal around the cap with one hand—Carlson had to open it for me. *Thank you, my enemy.* Weird, weird, weird! I palmed a pill, pretending to swallow it. He looked satisfied.

"Thanks, Doc."

"Please don't call me 'Doc'," he asked. "My name is Wendell Carlson."

If he was expecting a reaction, he was disappointed. "Sure thing, Wendell. I'm Tony Latimer. Pleased to meet you." It was the first name that entered my head.

There was a lull in the conversation. We studied each other with the frank curiosity of men who have not known human company for a while. At last he looked embarrassed again and tore his gaze from mine. "I'd better see about that food. You must be terribly hungry."

I thought about it. It seemed to me that I could put away a quarter-horse. Raw. With my fingers. "I could eat."

Carlson left the room, looking at his sandals.

I thought of loading the hypo with an overdose and ambushing him when he returned, but it was just a thought. That hypo was mighty far away. I returned my at-

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tention to the jar on the table. It still said it was demerol—and it *had* been sealed, with white plastic. But Carlson could have soaked off and replaced a skull-and-crossbones label—I decided to live with the pain awhile longer.

It seemed like a long time before he returned, but my time-sense was not too reliable. He fetched a half-loaf of brown bread, a mason jar of soymilk and some thick, crystallized honey. They say that smell is essential to taste, and I couldn't unplug, but it tasted better than food ever had before.

"You never told me where you get honey, Wendell."

"I have a small hive down in Central Park. Only a few supers, but adequate for my needs. Wintering the bees is quite a trick, but I manage."

"I'll bet it is." Small talk in the slaughterhouse. I ate what he gave me and drank soymilk until I was full. My body still hurt, but not as much.

We talked for about half an hour, mostly inconsequentialities, and it seemed that a tension grew up between us, because of the very inconsequentiality of our words. There were things of which we did not speak, of which innocent men should have spoken. In my dazed condition I could concoct no plausible explanation for my presence in New York, nor for the shot I had fired at him. Somehow he accepted this, but in return I was not to ask him how he came to be living in New York City. I was not supposed to have any idea who Wendell Morgan Carlson was. It was an absurd bargain, a truth-level impossible to maintain, but it suited both of us. I couldn't imagine what he thought of my own conversational omissions, but I was convinced that his silence was an admission of guilt, and my resolve was firmed. He left me at last, advising me to sleep if I could and promising to return the next day.

I didn't sleep. Not at first. I lay there looking at the demerol bottle for a hundred years, explaining to myself how unlikely it was that the bottle wasn't genuine. I could not help it—hatred and distrust of Carlson were ingrained in me.

But enough pain will break through the strongest conditioning. About sundown I ate the pill I'd palmed, and in a very short time I was unconscious.

The next few days passed slowly.

Woops—I'm out of tape. Time to flip over the re—

CHAPTER SEVEN

Stone Tape Transcript, Side Two

The days passed slowly, but not so slowly as the pain. Lucidity returned slowly, but no faster than physical strength.

You've got to understand how it was, Teach'.

The demerol helped—but not by killing pain. What it did was keep

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me so stoned that I often forgot the pain was there. In a warm, creative glow I would devise a splendidly subtle and poetic means of Killing Carlson–then half an hour later the same plan would seem hopelessly crackbrained. An imperfection of the glass in the window across the room, warping the clean proud curve of the Lowe Dome, held me fascinated for hours–yet I could not seem to concentrate for five minutes on practical matters.

Carlson came and went, asking few questions and answering fewer, and in my stupor I tried to fire my hate to the killing point, and–Collaci, my instructor and mentor and (I hope) friend–I failed.

You must understand me–I spent hours trying to focus on the hatred my father had passed on to me, to live up to the geas that fate had laid upon me, to do my duty. But it was damned hard work. Carlson was an absurd combination: so absent-minded as to remind me of Dad–and as thoughtful, in his way, as you. He would forget his coat when he left at night–but be back on time with a hot breakfast, shivering and failing to notice. He would forget my name, but never my chamberpot. He would search, blinking, in all directions for the coffee cup that sat perched on his lap, but he never failed to put mine where I could reach it without strain on my ribs. I discovered quite by accident that I slept in the only bed Carlson had ever hauled into Butler, that he himself dossed on a makeshift bed out in the hall, so as to be near if I cried out in the night.

He offered no clue to his motivations, no insight into what kept him entombed in New York City. He spoke of his life of exile as a simple fact, requiring no explanation. It seemed more and more obvious that his silence was an admission of guilt: that he could not explain his survival and continued presence in this smelly mausoleum without admitting his crime. I tried, how I tried, to hate him.

But it was damnably difficult. He supplied my needs before I could voice them, wants before I could form them. He sensed when I craved company and when to leave me be, when I needed to talk and when I needed to be talked to. He suffered my irritability and occasional rages in a way that somehow allowed me to keep my self-respect.

He was gone for long periods of time during the day and night, and never spoke of his activities. I never pressed him for information; as a recuperating assassin it behooved me to display no undue curiosity. I could not risk arousing his suspicions.

We never, for instance, chanced to speak of my weapons or their whereabouts.

And so the subconscious tension of our first conversation stayed with us, born of the things of which we

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did not speak. It was obvious to both of us—and yet it was a curious kind of kinship, too: both of us lived with something we could not share, and recognized the condition in the other. Even as I planned his death I felt a kind of empathy between Wendell Morgan Carlson and myself. It bothered hell out of me. If Carlson was what I *knew* he was, what his guilty silence only proved him to be, then his death was necessary and just—for my father had taught me that debts are always paid. But I could not help but like the absent-minded old man.

Yet that tension was there. We spoke only of neutral things: where he got gasoline to feed the generator that powered wallsockets in the ground-floor rooms (we did not discuss what he would store it in now that I'd ruined his 200-gallon tank). How far he had to walk these days to find scavengeable flour, beans and grains. The trouble he had encountered in maintaining the University's hydroponics cultures by himself. What he did with sewage and compost. The probability of tomatoes growing another year in the miserable sandy soil of Central Park. What a turkey he'd been to not think of using the pure-grain alky in Organic Chem for fuel. Never did we talk of why he undertook all the complex difficulty of living in New York, nor why I had sought him here. He . . . diverted the patient with light conversation, and the patient allowed him to do so.

I had the hate part all ready to go, but I couldn't superimpose my lifetime picture of Carlson over this fuzzy, pleasant old academic and make it fit. And so the hate boiled in my skull and made convalescence an aimless, confused time. It got much worse when Carlson, explaining that few things on earth are more addictive than oral demerol, cut me off cold turkey in my second week. Less potent analgesics, Talwin, aspirin, all had decayed years ago, and if I sent Carlson rummaging through the rucksack I had left under a station wagon on 114th Street for the remaining weed, he would in all likelihood come across the annotated map of New York given me by Collaci, and the mimeo'd Carlson Poster. Besides, my ribs hurt too much to smoke.

One night I woke in a sweat-soaked agony to find the room at a crazy angle, the candle flame slanting out of the dark like a questing tongue. I had half-fallen out of bed, and my right arm kept me from falling the rest of the way, but I could not get back up without another arm. I didn't seem to have one. Ribs began to throb as I considered the dilemma, and I cried out from the pain.

From out in the hallway came a honking snore that broke off in a grunted "Whazzat? Wha?" and then a series of gasps as Carlson

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dutifully rolled from his bed to assist me. There came a crash, then a greater one attended by a splash, then a really tremendous crash that echoed and re-echoed. Carlson lurched into view, a pot-bellied old man in yellow pajamas, eyes three-quarters closed and unfocused, one foot trapped in a galvanized wastebasket, gallantly coming to my rescue. He hit the doorframe a glancing blow with his shoulder, overbalanced and went down on his face. I believe he came fully awake a second after he hit the floor; his eyes opened wide and he saw me staring at him in dazed disbelief from a few inches away. And for one timeless moment the absurdity of our respective positions hit us, and we broke up, simultaneous whoops of laughter at ourselves that cut off at once, and a second later he was helping me back into bed with strong, gentle hands, and I was trying not to groan aloud.

Dammit, I liked him.

Then one day while he was away I rose from the bed all by myself, quite gratified to find that I could, and hobbled like an old, old man composed of glass to the window that looked out on the entrance area of Butler and the hedge-hidden quadrangle beyond. It was a chill, slightly off-white day, but to me even the meager colors of shrub and tree seemed unaccountably vivid. From the overfamiliar closeness of the sickroom, the decaying campus had a magnificent depth. Everything was so *far away.* It was a little overwhelming. Moving closer to the window, I looked to the right.

Carlson stood before the front doors, staring up at the sky over the quadrangle with his back to me. On his head was the same curious helmet I had seen once before, days ago, framed in the crosshairs of my rifle. The odd-looking machine was before him, wired to his helmet and his arms. I wondered again what it could be, and then I saw something that made me freeze, made me forget the pain and the dizziness and stare with full attention.

Carlson was staring down the row between two greatly overgrown hedges that ran parallel to each other and perpendicular to Butler, facing toward Lowe's mighty cascade of steps. But he stared as a man watching something *near* him, and its position followed that of the wind-tossed upper reaches of the hedges.

Intuitively I knew that he was using the strange machine to communicate with a Musky, and all the hatred and rage for which I had found no outlet boiled over, contorting my face with fury.

It seemed an enormous effort not to cry out some primal challenge; I believe I bared my teeth. *You bastard,* I thought savagely, *you set us up for them, made them our enemies, and now you're hand in glove*

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with them. I was stupified by such incredible treachery, could not make any sense of it, did not care. As I watched from behind and to the left I saw his lips move silently, but I did not care what they said, what kind of deal Carlson had worked out with the murderous gas-clouds. He had one. He dealt with the creatures that had killed my mother, that he had virtually created. He would soon die.

I shuffled with infinite care back to bed, and planned.

I was ready to kill him within a week. My ribs were mostly healed now—I came to realize that my body's repair-process had been waiting only for me to decide to heal, to leave the safe haven of convalescence. My strength returned to me and soon I could walk easily, and even dress myself with care, letting the left sleeve dangle. Most of the pain was gone from the stump, leaving only the many annoying tactile phenomena of severed nerves, the classic "phantom arm" and the flood of sweat which seemed to pour from my left armpit but could not be found on my side. Thanks to Carlson's tendency toward sound sleep, I was familiar with the layout of the main floor—and had recovered the weapons he was too absent-minded to destroy. He had "hidden" them in the broom closet.

I wanted to take him in a time and place where his Musky pals couldn't help him; it seemed to me certain that the ones I had destroyed were bodyguards. A blustery cold night obliged by occurring almost immediately, breezes too choppy to be effectively used by a windrider.

The kind of night which, in my childhood, we chose for a picnic or a hayride.

We ate together in my room, a bean and lentil dish with tamari and fresh bread, and as he was finishing his last sip of coffee I brought the rifle out from under the blanket and drew a bead on his face.

"End of the line, Wendell."

He sat absolutely still, cup still raised to his lips, gazing gravely over it at me, for a long moment. Then he put the cup down very slowly, and sighed. "I didn't think you'd do it so soon. You're not well enough, you know."

I grinned. "You were expecting this, huh?"

"Ever since you discovered your weapons the night before last, Tony."

My grin faded. "And you let me live? Wendell, have you a death wish?"

"I cannot kill," he said sadly, and I roared with sudden laughter.

"Maybe not any more, Wendell. Certainly not in another few minutes." *But you have killed before, killed more than anyone in history. Hell, Hitler, Attila, they're all punks beside you!*

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He grimaced. "So you know who I am."

"The whole world knows. What's left of it."

Pain filled his eyes, and he nodded. "The last few times I tried to leave the city, to find others to help me in my work, they shot at me. Two years ago I found a man down in the Bowery who had been attacked by a dog-pack. He had a tooth missing. He said he had come to kill me, for the price on my head, and he died, cursing me, in my arms as I brought him here. The price he named was high, and I knew there would be others."

"And you nursed me back to health? You must know that you deserve to die." I sneered. "Musky-lover."

"You know even that, then?"

"I saw you talking with them, with that crazy helmet of yours. The ones who attacked me were your bodyguards, weren't they?"

"The windriders came to me almost twenty years ago," he said softly, eyes far away. "They did not harm me. Since then I have slowly learned to speak with them, after a fashion, using the undermind. We might yet have understood one another."

The gun was becoming heavy on my single arm, difficult to aim properly. I rested the barrel on my knee, and shifted my grip slightly. My hands were sweaty.

"Well?" he said gruffly. "Why haven't you killed me already?"

A good question. I swept it aside irritably. "Why did you do it?" I barked.

"Why did I create the Hyperosmic Virus?" His weathered face saddened even more, and he tugged at his beard. "Because I was a damned fool, I suppose. Because it was a pretty problem in biochemistry. Because no one else could have done it, and because I wasn't certain that I could. I never suspected when I began that it would be used as it was."

"Its release was a spur of the moment decision, is that it?" I snarled, tightening my grip on the trigger.

"I suppose so," he said quietly. "Only Jacob could say, of course."

"*Who?*"

"Jacob Stone," he said, startled by my violence. "My assistant. I thought you said you . . ."

"So you knew who I was all the time," I growled.

He blinked at me, plainly astounded. Then understanding flooded his craggy features. "Of course," he murmured. "Of *course*. You're young Isham—I should have recognized you. I smelled your hate, of course, but I never . . ."

"You *what?*"

"Smelled the scent of hate upon you," he repeated, puzzled. "Not much of a trick—you've been reeking with it lately."

How could he? . . . impossible, sweep it aside.

"And now I imagine you'll want

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to discharge that hate and avenge your father's death. That was his own doing, but no matter: it was I who made it possible. Go ahead, pull the trigger." He closed his eyes.

"My father is not dead," I said, drowning now in confusion.

Carlson opened his eyes at once. "No? I assumed he perished when he released the Virus."

My ears roared; the rifle was suddenly impossible to aim. I wanted to cry out, to damn Carlson for a liar, but I knew the fuzzy professor was no actor and all at once I sprang up out of the bed and burst from the room, through wrought-iron lobby doors and out of the great empty hall, out into blackness and howling wind and a great swirling kaleidoscope of stars that reeled drunkenly overhead. Ribs pulsing, I walked for a hundred years, clutching my idiot rifle, heedless of danger from Musky or hungry Doberman, pursued by a thousand howling demons. Dimly I heard Carlson calling out behind me for a time, but I lost him easily and continued, seeking oblivion. The city, finding its natural prey for the first time in two decades, obligingly swallowed me up.

More than a day later I had my next conscious thought. I became aware that I had been staring at my socks for at least an hour, trying to decide what color they were.

My second coherent thought was that my ass hurt.

I looked around: beyond smashed observation windows, the great steel and stone corpse of New York City was laid out below me like some incredible three-dimensional jigsaw. I was at the top of the Empire State Building.

I had no memory of the long climb, nor of the flight downtown from Columbia University, and it was only after I had worked out how tired I must be that I realized how tired I was. My ribs felt sandblasted and the winds that swept the observation tower were very very cold.

I was higher from the earth than I had ever been before in my life, facing south toward the empty World Trade Center, toward that part of the Atlantic into which this city had once dumped five hundred cubic feet of human shit every day; but I saw neither city nor sea. Instead I saw a frustrated, ambitious black man, obsessed with a scheme for quick-and-easy world salvation, conning a fuzzy-headed genius whose eminence he could never hope to attain. I saw that man, terrified by the ghastly results of his folly, fashioning a story to shift blame from himself and repeating it until all men believed it—and perhaps he himself as well. I saw at last the true face of that story's villain: a tormented, guilt-driven old man, exiled for the high crime of gullibility, befriended only by his

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race's bitterest enemies, nursing his assassin back to health. And I saw as though for the first time that assassin, trained and schooled to complete a cover-up, the embittered black man's last bucket of whitewash.

My father had loaded me with all the hatred and anger he felt for himself, aimed me toward a scapegoat and fired me like a cannon.

But I would ricochet.

I became aware of noise below me, in the interior of the building. I waited incuriously, not even troubling to lift my rifle from my lap. The noise became weary footsteps on the floor below me. They shuffled slowly up the iron stairway nearest me, and paused at the top. I heard hoarse, wheezing breath, struggling to slow itself, succeeding. I did not turn.

"Hell of a view," I said, squinting at it.

"View of a hell," Carlson wheezed behind me.

"How'd you find me, Wendell?"

"I followed your spoor."

I spun, stared at him. "You—"

"Followed your spoor."

I turned around again, and giggled. The giggle became a chuckle, and then I sat on it. "Still got your adenoids, eh, Doc? Sure. Twenty years in this rotten graveyard and I'll bet you've never owned a set of nose plugs. Punishment to fit the crime—and then some."

He did not reply. His breathing was easier now.

"My father, Wendell, now there's an absent-minded man for you," I went on conversationally. "Always doing some sort of Civilized work, always forgetting to remove his plugs when he comes home—he surely does take a lot of kidding. Our security chief, Phil Collaci, quietly makes sure Dad has a Guard with him at all times when he goes outdoors—just can't depend on Dad's sense of smell, Teach' says. Dad always was a terrible cook, you know? He always puts too much garlic in the soup. Am I boring you, Wendell? Would you like to hear a lovely death I just dreamed? I am the last assassin on earth, and I have just created a brand-new death, a unique one. It convicts as it kills—if you die, you deserve to." My voice was quite shrill now, and a part of me clinically diagnosed hysteria. Carlson said something I did not hear as I raved of toilet bowls and brains splashing on a sidewalk and impossible thousands of chittering gray rats and my eyes went nova and a carillon shattered in my skull and when the world came back I realized that the exhausted old man had slapped my head near off my shoulders. He crouched beside me, holding his hand and wincing.

"Why have no Muskies attacked me, here in the heights?" My voice was soft now, wind-tossed.

"The windriders project and receive emotions. Those who sorrow as you and I engender respect and

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fear in them. You are protected now, as I have been these twenty years. An expensive shield."

I blinked at him and burst into tears.

He held me then in his frail old arms, as my father had never done, and rocked me while I wept. I wept until I was exhausted, and when I had not cried for a time he said softly, "You will put away your new death, unused. You are his son, and you love him."

I shivered then, and he held me closer, and did not see me smile.

So there you have it, Teach'. Stop thinking of Jacob Stone as the Father of Fresh Start, and see him as a man—and you will not only realize that his sense of smell was a hoax, but like me will wonder how you were ever taken in by so transparent a fiction. There are a dozen blameless explanations for Dad's anosmia—none of which would have required pretense.

So look at the method of his dying. The lid of the septic tank will be found ajar—the bathroom will surely smell of chlorine. Ask yourself how a chemist could possibly walk into such a trap—*if he had any sense of smell at all?*

Better yet, examine the corpse for adenoids.

When you've put it all together, come look me up. I'll be at Columbia University, with my good friend Wendell Morgan Carlson. We have a lot of work to do, and I suspect we'll need the help of you and the Council before long. We're learning to talk with Muskies, you see.

If you come at night, I've got a little place of my own set up in the lobby of the Waldorf-Astoria. You can't miss me. But be sure to knock: I'm Musky-proof these days, but I've still got those subconscious sentries you gave me.

And I'm scared of the dark. ■

THE ANALYTICAL LABORATORY, AUGUST 1976

Place	Title	Author	Points
1	Shadrach In The Furnace	*Robert Silverberg*	1.651
2	The Far Traveller	*A. Bertram Chandler*	2.594
3	Render Unto Caesar	*Eric Vinicoff and Marcia Martin*	2.681
4	The Tomkins Battery Case	*Bud Sparhawk*	2.984

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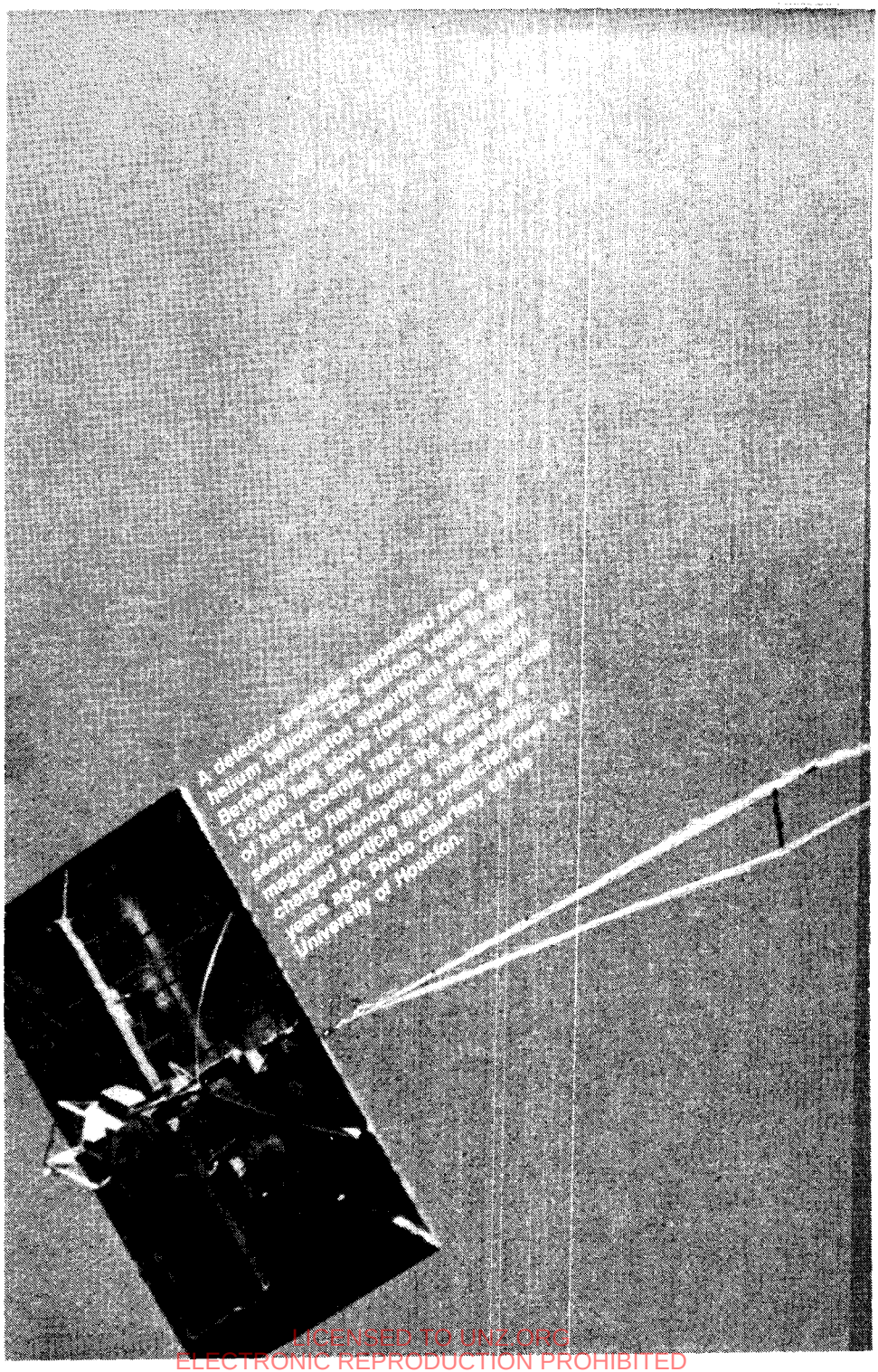

A detector package suspended from a helium balloon. The balloon used by Berkeley scientists and engineers was 150,000 feet above Israel early in March of heavy cosmic rays. Later, analysis of seems to have found the tracks of a magnetic monopole, a magnetically charged particle that predicted over 40 years ago. Photo courtesy of the University of Houston.

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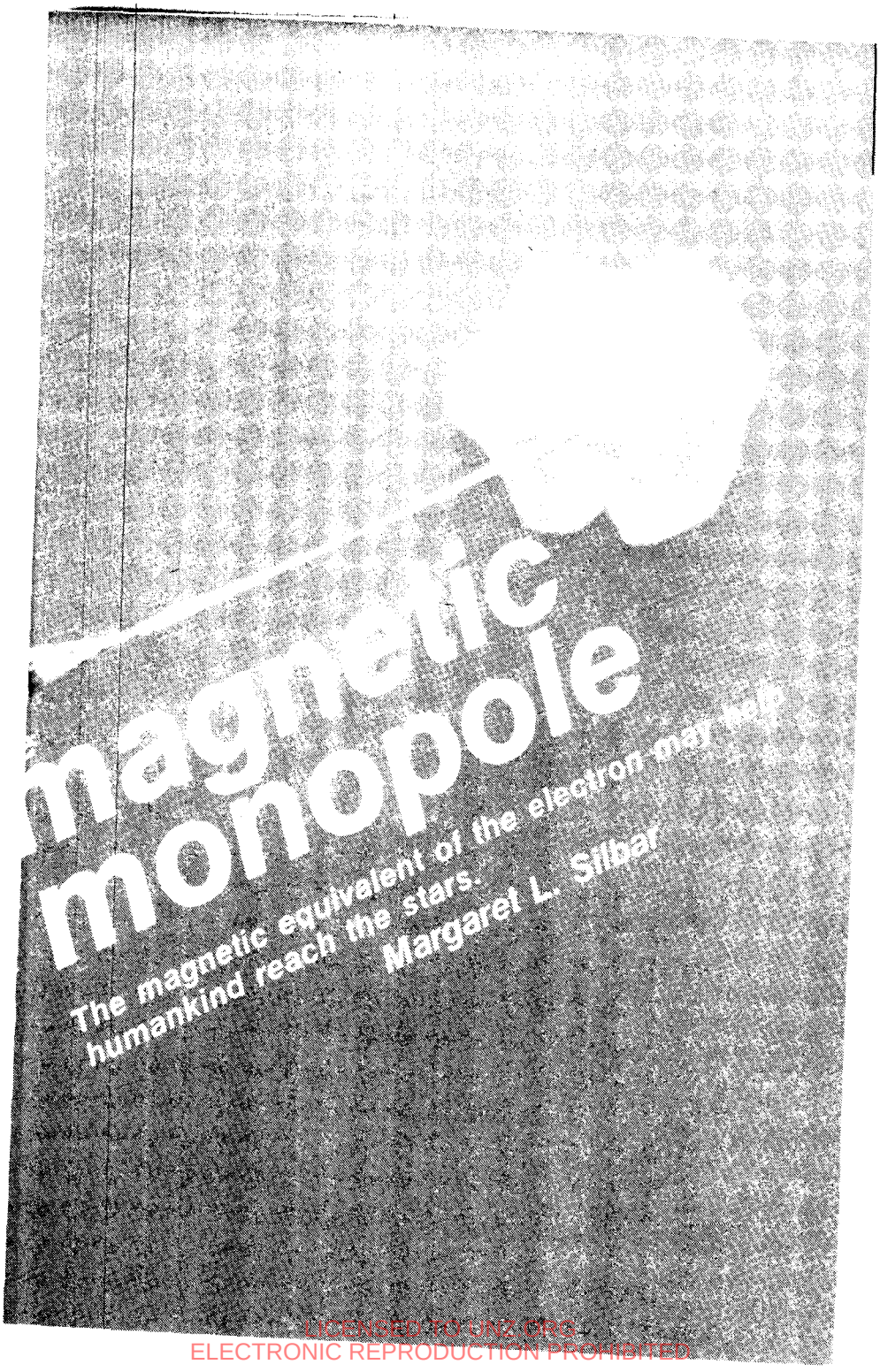

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It is tools that have helped man develop a technology, and one of the most versatile of all the tools at his disposal is the electron. It is almost impossible to conceive of any other tool that could be as useful, yet one may exist—the magnetic analogue of the electron, called the magnetic monopole.

Electrons are separate, discrete particles, and, courtesy of electrons and the electricity they produce, our technological world runs. Magnetism, on the other hand, has traditionally been thought of as no more than a by-product of electricity, something which is produced only by the motions of electrically-charged particles, like electrons. This picture of the electromagnetic world involves the following postulate. When you break a piece of magnetized iron in two, each piece is then a new magnet with a north and south pole. Moreover, you can continue subdividing magnets, always coming up with new magnets, right down to the subatomic scale. In fact, one finds that electrons, protons and neutrons are themselves magnets, each with a north and a south pole.

Until recently, an *isolated* north or south pole has never been found, and that's what this story is all about. For, last summer a group of experimental physicists from the University of Houston and the University of California at Berkeley found what they believe are the tracks of one.

Predicted over forty years ago, a magnetic monopole is one of these isolated north or south magnetic poles. In other words, it carries a new kind of "charge," quite analogous to the electric charge carried by the ordinary, household electron. This "charge" is not, however, coupled directly to the electric field, but rather to the magnetic field.

The analogy is an exact one. An electron feels a force and is shoved around by a steady electric field. So does a magnetically-charged quantity, a magnetic monopole for instance, feel a force and respond to a steady magnetic field. The difference, however, is a big one—the force felt by a magnetic monopole in its force field would be huge in comparison.

Moreover, the monopole is, or would be, an entirely new kind of elementary particle—a basic build-

ABOUT THE AUTHOR Margaret Silbar says of herself, "I have the dubious distinction of being an ex-obituary writer, an ex-Indian-affairs reporter, an ex-science reporter, an ex-weekly-newspaper editor, and an ex-Washingtonian, who was wont to write about Harry, Lady, Lynda, and all the other birds then living in the Capitol. I now live in a town full of physics jocks (Los Alamos) and happen to enjoy thinking and writing about science." For Analog, she has written about quarks, gamma-ray and x-ray astronomy, the solar wind, and robots.

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ing block, a "quantum," for magnetism in the same way that an electron is the smallest possible unit of electric charge. All the "ordinary" elementary particles—protons, electrons and neutrons—either carry electrical charge or are electrically neutral, but none carries a magnetic charge. The world, as we know it, seems to be made up only of these ordinary elementary particles, some of which are listed in Table 1. *(p. 76)*

What brings this forty-five-year-old prediction into the recent news is a rather peculiar track the Berkeley-Houston team found in their detection apparatus, while searching the sky for ultra-heavy cosmic rays. This track is the trace of a particle which looks very, very much like a magnetic monopole, and may even be one. The particle was moving downwards towards the earth, at half the speed of light. If a monopole, its mass is estimated at being more than 600 times that of the proton.

As might be expected, not all physicists are convinced that this single event proves or disproves the existence of the long-sought monopole. In dealing with single events, cautions one physicist, "appeals to probability are notoriously dangerous." As a result, a number of groups around the country are feverishly working to accumulate more evidence one way or the other. If this track is that of a monopole, some long-standing physics mysteries, which we will discuss, would be resolved. But if it is not, and if it can be shown that monopoles do not (and cannot) exist, then we must reexamine our picture of the world, for it is built on false premises.

First, however, we will turn towards history, to understand why and how the concept of the magnetic monopole arose and what its place in the natural scheme of things would be. Then we will discuss the first experimental search for monopoles, which did not take place until 1951, and later searches, which have looked at everything from 248-million-year-old mica to sludge from the ocean's bottom. Finally, we will come to the Berkeley-Houston experiment and end by discussing some speculations about the monopole. The speculations are many, varied and somewhat premature. Nonetheless, it is true that a magnetic monopole, if we could get our hands on one, would be a powerful tool indeed.

This story really began some 130 years ago when Michael Faraday, the self-taught bookbinder-turned-scientist, invented some pictures of how electricity and magnetism work. The concept of the electric and magnetic "field" was studied closely by the Scotsman James Clerk Maxwell, who died in the same year Einstein was born and who was perhaps his greatest immediate predecessor.

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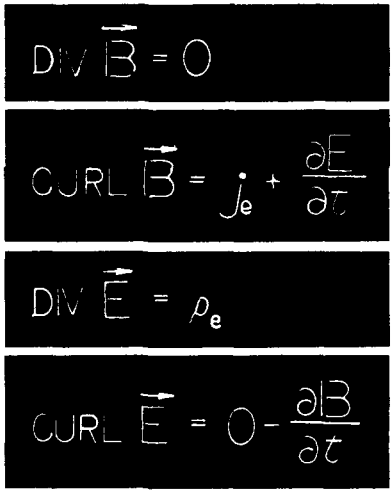

Fig. 1. Maxwell's equations in a vector differential form. In Maxwell's equations, magnetism is merely a by-product of electricity. In 1931, Dirac proposed the magnetic monopole as a means of filling in the zeros in the first and fourth equations. The zero in the first is filled by magnetic charge; that in the fourth, by magnetic current density.

Maxwell, as a child, always wanted to discover of anything "how it doos." As an adult in 1862, he abstracted Faraday's ideas into a beautiful set of mathematical equations. (The equations are pictured in Fig. 1; the more adventurous apostles of these equations even wear T-shirts bearing them across the chest.) Electricity and magnetism are still mysterious forces, but they behave according to certain consistent, logical, sharply-defined rules. Maxwell's equations explain *all* of the classical electromagnetic phenomena and are as well a fundamental part of Einstein's theory of relativity and of modern quantum mechanics.

The lines of force which describe an electric field are pictured (as in Fig. 2) as rays diverging from an electric charge or as closed curves surrounding a changing magnetic field. Those which describe a magnetic field, however, are *always* (as in Fig. 2) closed curves surrounding either a changing electric field or a moving electric charge. They never diverge from a source. At least, according to Maxwell.

At first glance, this seems no more than the way of the world, simply the way things are. But physicists have quite a bit of respect for the design of the universe; they believe there are patterns, or symmetries, in nature and her laws. Searching for symmetries has, moreover, been a winning approach to physics in the past seventy years. (Einstein was an early advocate of this approach and a strong one at that.) Maxwell's equations are, however, asymmetrical. There is *no* magnetic particle that gives rise to magnetic fields and which, in motion, produces an electric field.

It was not for seventy years, until 1931, that the "hole" in Maxwell's equations was repaired.* Nobel prize-winning theoretical physicist

** It had, however, been recognized much earlier, notably by the French mathematician, Henri Poincaré in 1896.*

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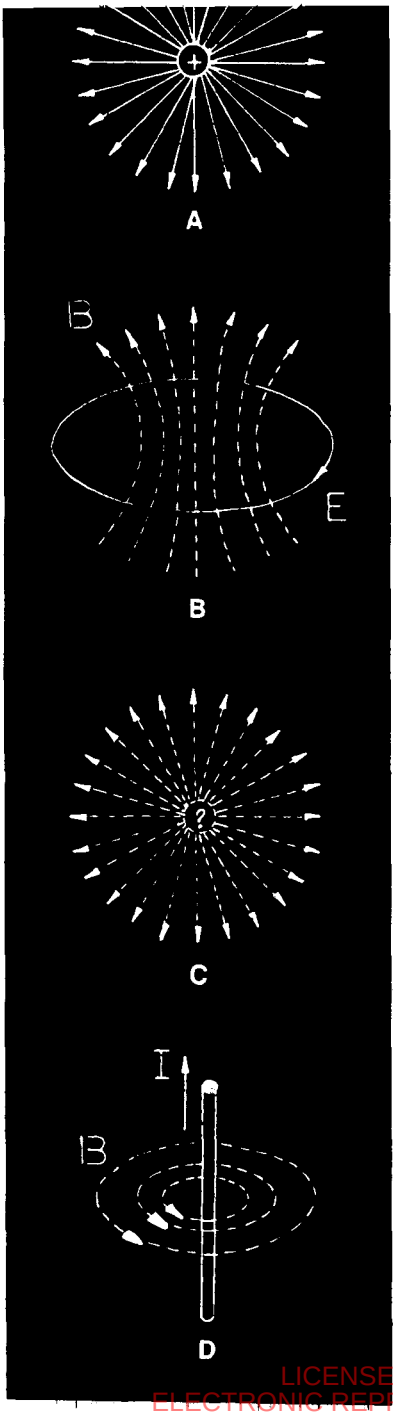

P.A.M. Dirac, who in that same year predicted the positron, the electron's antiparticle, pointed to the first and fourth of Maxwell's equations (shown in Fig. 1). Bearing in mind the zeros on the right-hand sides, he tried to make the generalized Maxwell equations fit into the then-new quantum theory.

Dirac, a man who has spent his life looking for "beauty in mathematics," proposed an elementary particle of magnetism, a magnetic monopole. Just as there are elementary particles with electric charge, he said, so must there be elementary particles with magnetic charges, i.e., "north" and "south." (The zero in "div $\vec{B} = 0$" is thus filled by magnetic charge; the zero in the fourth equation, by magnetic current density.)

Dirac is responsible for essentially all the important physical

Fig. 2. The lines of force which describe electric and magnetic fields are shown here. Electrical field lines are sketched as solid lines; magnetic field lines, as dotted ones. In (A) the electrical field diverges from a positive electric charge, the proton. In (B) the electric field arises from a changing magnetic field and is shown as closed curves surrounding that field. (C) is an indication of the asymmetry in the picture; if there is *no* monopole, where then is the source of magnetic charge? In (D) are shown the closed curves always used to describe a magnetic field. In this case, the curves encircle a changing electric field, which is in the wire and which points upwards.

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features of the theory of magnetic monopoles. In the beginning, in 1931, it seems as though Dirac was going to shed some light on the mysterious "fine structure constant," an ever-recurring constant appearing profusely in all of modern-day physics. The reason the fine structure constant is mysterious is that, to now, we don't know why it has the value it does. This remarkable dimensionless constant, which plays an integral role in this story, is written as $e^2/\hbar c = 1/137$* where "e" is the electric charge of the electron, "c" is the speed of light and "ħ" is Planck's constant. This so-called quantum of action, ħ, appears in all atomic, nuclear and high energy processes. Exactly how important it is can be seen in the following Gedanken experiment. If it, for some reason, were to decrease steadily until it became zero, all quantum phenomena would disappear. As would atoms as we know them. And life itself.

Be that as it may, Dirac was able to show that, in a quantum theory, electrical charges and magnetic monopoles can only co-exist if both are quantized, if both exist as discrete bundles of charge. Electrical charge, he said, comes in units of "e" (as observed), and magnetic charge in units of "g," with the product of "g" and "e" being related by the formula, $eg = \frac{1}{2}\hbar c$, (or some integral multiple of the right-hand side). As a result of this and the definition of the fine structure constant, "g," the charge of the magnetic monopole, has quite a large value, $g = \frac{1}{2}(\hbar c/e^2)e = 137e/2$, or some integral multiple of this. The quantization of magnetic charge is 68.5 times as large as that of electric charge, which may be one reason for the monopole's elusiveness.

In addition, Dirac showed that quantum mechanics does not preclude the existence of an isolated magnetic pole. Moreover, he concluded, the formalism of quantum mechanics leads inevitably to equations whose *only* interpretation is the motion of an electron in the field of a single magnetic pole. "It would be surprising," he continued, "if nature made no use of it (the magnetic monopole)."

Dirac's relationship is exceedingly important for it "gives the reason for the existence of the smallest electric charge." That is, in fact, a strong argument for the existence of the magnetic monopole. For without the monopole, the quantization of electrical charge is "nothing more than an isolated experimental observation."

A monopole á la Dirac also would clear up some other mysteries, such as why fractionally-charged quarks have not been observed and why photons are massless. In a world with only electrical charges, there appears to be no reason why the photon, the fundamen-

*Actually, the denominator is 137.03602 ± 0.00021.

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tal quantum of light, could not have a mass. But it does not, a fact we know to very high precision from space satellite data. One way to explain this is to assume the existence of a monopole, and, to understand the "why," we'll have to back up a bit and talk about the conservation of angular momentum.

Angular momentum has been a key idea in physics ever since Johannes Kepler wrote down his laws of planetary motion. Kepler did not recognize it as such, but his second law (the so-called law of areas) is equivalent to a law of conservation of angular momentum. This conservation law results from the requirement that physics laws must be rotationally invariant. That is to say, it ought to make no difference to a mathematical description whether an observer looks at phenomena standing on his head, or lying down sideways. The equations controlling these phenomena should be valid no matter from which direction the phenomena are viewed.

Now one can show that a semiclassical, nonrelativistic monopole, together with a massive photon, involves a theory which is *not* rotationally invariant. The resultant theory is direction dependent, something no physicist wants or believes possible. But with a massless photon, the rotational invariance *is* preserved. Thus we can have a consistent quantum theory of electric

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and magnetic charges only when the photons which appear are massless.

Much the same kind of argument holds for quarks, those hypothetical entities with electrical charges +2e/3 and -e/3, which are regarded by some as "the elementary particles to end all." The Dirac relationship for "ge" must hold for *any* monopole, say of charge M, and for any electric charge, say of charge Q. That is, MQ = nħc/2, for some integer n. The Berkeley-Houston monopole candidate has M = ħc/e. Thus the possible values for Q are $Q = n\hbar c/2M = ne/2$. For no integer n, therefore, can we have Q = 2e/3 or -e/3; i.e., quarks of such fractional charges cannot exist.

This would, in a way, be something of a relief, for it would save us from nightmarish thoughts that there might be a succession of ever-smaller, fractionally-charged particles, waiting to be discovered at ever-higher energies. But the quark model has proved a helpful way of classifying the many particles in the elementary electrical particle zoo. Thus, there are those who would like to preserve quarks, if only as "fictitious mathematical constructs." So, concede these physicists, quarks may not exist as free, observable particles, but just because we couldn't ever see a quark doesn't necessarily mean they aren't "there," at the base of things. Perhaps, the argument goes, no one quark can ever get free of its brothers ("infrared slavery"), and all we could ever hope to see are groups of these quarks, having integer charge. Such an argument sat-

PARTICLE	PREDICTED	DISCOVERED
Electron	....	1897
Proton	....	1911
Muon	....	1937
Strange particles	....	1947-53
Psi particles	....	1974
Photon	1905	1916
Neutron	1920	1932
Antiparticles (positron)	1931	1932
Neutrino	1930	1953
Pi meson	1935	1947
Magnetic monopole	1931	1975?
Graviton	1930	....
Tachyon	1962	....
Quarks	1964	....

Table 1. An abbreviated list of predicted and discovered particles is given here. For predicted particles, the first date given is the year of prediction; the last date, the year of discovery. The table, even without the inclusion of all of the 200 or so elementary particles, indicates something of the evolution of the subnuclear world in this century. All of the particles listed here, with the exception of the monopole, are electrically-charged particles, or neutral.

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isfies many quark advocates. It also explains the lack of success of the many clever people, who, despite a lot of hard looking, have never found an isolated quark.

The only thing physicists really know about a magnetic monopole is that such a hypothetical creature will have a large magnetic charge. Theorists haven't been able to tell us anything definite about its mass, radius, spin, electrical charge, or how it would interact with other particles. They have, however, been able to infer a number of things about how it might behave, on the basis of its large magnetic charge. Presumably, if a monopole has a large magnetic charge, it would also have a large electromagnetic interaction, and a large rest mass. For example, the attractive force between a "north" monopole and a "south" monopole would be 4,692 times larger than that between an electron and a proton.

It is generally assumed that magnetic charge, like electric charge, is conserved. The net sum of all positive and negative (and by extrapolation, "north" and "south") charges never changes. If a positive charge is produced, then so must an equal negative charge, to balance the books. Hence, a magnetic monopole would have to be born in conjunction with its oppositely-charged antiparticle. A monopole pair could, for instance, be born in an upper atmospheric collision of an energetic cosmic ray particle with an atom of nitrogen or oxygen. Some must, moreover, have been created in the primordial Big Bang, along with all the electrons, protons and neutrons in the universe. But what has happened to the survivors?

There are those who say that, since the universe seems predominated by electric charge, an unattached monopole would be perpetually accelerated. Such a monopole would encounter only dipolar magnetic fields in the vastness of interstellar space. These cosmic fields, with their closed lines of force, would act like accelerating funnels for the monopole, pushing it to ever-higher energies. A monopole, which had been picking up kinetic energy since the beginning of the universe (3×10^{17} seconds ago) would by now have an energy of about 10^{20} eV,* an energy comparable to that of the most energetic cosmic ray particles.

A primordial monopole with an energy of 10^{20} eV would not be affected by the earth's magnetic field or its atmosphere. It would push through the atmosphere unchallenged and bury itself deep in the sea or the earth. But if a monopole

** One "electron volt" (abbreviated "eV") is the amount of energy that an electron picks up in falling through an electrical potential of one volt. Other useful units of energy are the "MeV" (10^6 eV) and the "GeV" (10^9 eV). An energy of 10^{20} eV is sufficient to lift an average-sized man one inch off the ground. For orientation, this average-sized man consists of about 4×10^{26} atoms.*

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were created in the upper atmosphere, or if one somehow reached the earth with a lower energy, it would be attracted to the earth's opposite pole by the earth's magnetic field. If monopoles with opposite magnetic charges were arriving at the earth in equal numbers at a rate comparable to cosmic rays (one per square centimeter per second), they would have neutralized the earth's magnetic field in a month. But our magnetic field is still very much there. We can therefore conclude that monopoles, if they are visiting the earth at all, are doing so far less frequently, or not in equal numbers. At least today.

Low-energy monopoles may, however, have once bombarded the earth. The earth's magnetic field, geologists say, has reversed its polarity several times, at intervals of something like one million years. One speculation is that perhaps these reversals were caused by the arrival of a lot of low-energy monopoles, which temporarily threw the earth-dynamo, the source of the magnetic field, out of kilter.

It was not until 1951 and the perfection of photographic emulsion techniques that the first serious search for monopoles took place. W.V.R. Malkus at the University of Chicago had the idea of picking up a monopole, formed by a cosmic ray hitting an atom in the upper atmosphere. He reasoned that, if such a monopole had a low enough energy, it would travel along a nearby line of magnetic force to the opposite hemisphere of the earth.

The equipment for his experiment was relatively simple. A meter-long solenoid with a 250-gauss magnetic field was set up in alignment with the earth's magnetic field. A cosmic ray monopole passing through would hopefully be sucked by the magnetic field of the solenoid into an evacuated tube. Here it would be accelerated to 500 MeV, and, at the end of the tube, it would pass through a photographic emulsion, leaving its characteristic tracks behind. The idea, and it was a relatively new one in 1951, was that a monopole would ionize heavily any material it passed through, including the photographic emulsion.

This first experiment didn't come up with anything, but it was a beginning. It was, however, criticized by some for not being extensive enough. If, the critics said, magnetic monopoles were no more common than falling stars, such an experiment, with its limited collection area, would be highly unlikely to trap one.

The next natural step was to turn to high-energy particle accelerators, which were getting more and more energetic every year. Accelerators have, after all, been the traditional hunting ground for new elementary particles in the last twenty-five

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years. In Berkeley, in 1958, a beam of six GeV protons from the synchrotron was allowed to impinge on a suitable target in hopes of creating a monopole pair. The experiment was repeated in 1961 at CERN in Switzerland, with fourteen GeV protons and with no more success. And again, equally as unsuccessfully, in 1962, at Brookhaven National Laboratory; this time, however, thirty GeV protons were used. In no case were the protons energetic enough to create a monopole more massive than about three times that of the proton. That is to say, monopoles with such small masses simply do not exist.

Other groups of experimentalists have taken other tacks. No one knows how a magnetic monopole would behave in solid matter, but certain things do seem clear. A single monopole and a single electron wouldn't be likely to form a bound state. Nor would a monopole which has lost its kinetic energy, or energy of motion, interact strongly with an ordinary atom.

All these "rules" disappear, however, if a monopole runs into ferromagnetic material. Examples of ferromagnetic materials are the naturally-occurring iron-oxide stones called lodestones.* Lodestones, as Thales of Miletus discovered in 600 B.C., are magnetized and attract other ferromagnetic materials. They might, for instance, have attracted the apocryphal iron nails in Thales' sandals.

The significance of all this is that magnetic monopoles interact differently with such materials than with ordinary matter. It could be, for example, that monopoles got trapped in ferromagnetic ores millions of years ago and, because of their large binding energy, might still be there. In 1962, a group of physicists from various parts of the world, all at that time in Boston at the Francis Bitter National Magnet Laboratory, set out to pry a monopole out of solid ferromagnetic matter, or, failing that, drag it through. Henry Kolm and his colleagues first searched for trapped monopoles in a pinnacle in the northern Adirondack Mountains. This particular peak contained veins of pure magnetite, which, the physicists reasoned, were likely to have been exposed since the glacier receded. They searched 1,000 square centimeters for "north" monopoles, using a pulsed solenoid magnet strong enough to pull out monopoles buried several centimeters deep. They failed to find anything, but did, as they point out, give the earth a second southern magnetic pole. The pulses from their apparatus were so intense that they left the area oppositely magnetized.

Having failed in the mountains, the group then turned to ocean

** In fact, the word "magnetism" comes from the ancient Greek name for "lodestones."*

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bottom mud, but still to no avail. Other materials analyzed for monopoles by other researchers at various times by various methods include moon rock,* aluminum, carbon, chalk, copper and nickel (both solid and powdered), iron, lead, McMurdo rock from the Antarctic, manganese nodules from the ocean's bottom, meteorite, obsidian, steel, sulphur, and titanium and its oxide. No one has ever found anything.

We now come back to the most recent experiment, the one which gave rise to this story. The experiment was done by two physicists from Berkeley, P.B. Price and E.K. Shirk, and two from Houston, W.Z. Osborne and L.S. Pinsky. The strength of the monopole, which the team says it has seen, is said to be 137 times that of the electron, a number which is twice the minimum predicted by Dirac. In its paper, published in August, 1975, the team estimated the monopole's mass as over 200 proton masses. Since publication of the paper, this lower limit has been raised to about 600 proton masses.

At the time the track was found, the Berkeley-Houston team was searching the sky for heavy cosmic rays. Its helium balloon, complete with a detector package, is shown in the opening photograph. It was launched over Sioux City, Iowa, on September 18, 1973, and flew 130,000 feet above the ground for two-and-a-half days. The detector package (sketched in Fig. 3, along with the suspected monopole track) consisted of a combination of 32 Lexan plastic sheets,* a Cherenkov detector containing the fastest film Kodak can make, and a track-detecting photographic emulsion consisting of one of the densest films made.

Such a detector package is able to take advantage of a particular characteristic of the monopole. While it presumably would behave like any other particle as long as it is traveling at a velocity comparable to the speed of light, its behavior is unique when it slows down. Tracks made by electrically-charged particles become strikingly heavier near their termination, but those of a monopole do not. A monopole should leave a track whose ionization remains constant to the very end. This is exactly the kind of track the Berkeley-Houston team has found (except that there is no "end;" the particle passed completely through the whole detector stack). The uniformity of the track is a strong argument in favor of its having been made by a monopole. The team notes that an electrically-charged particle with a velocity half that of light would

** The moon has no magnetic field and might, therefore, be "a hell of a hideout" for monopoles.*

** One of the members of the Berkeley-Houston team pioneered the technique used to chemically etch Lexan sheets, thus developing the track left by a particle.*

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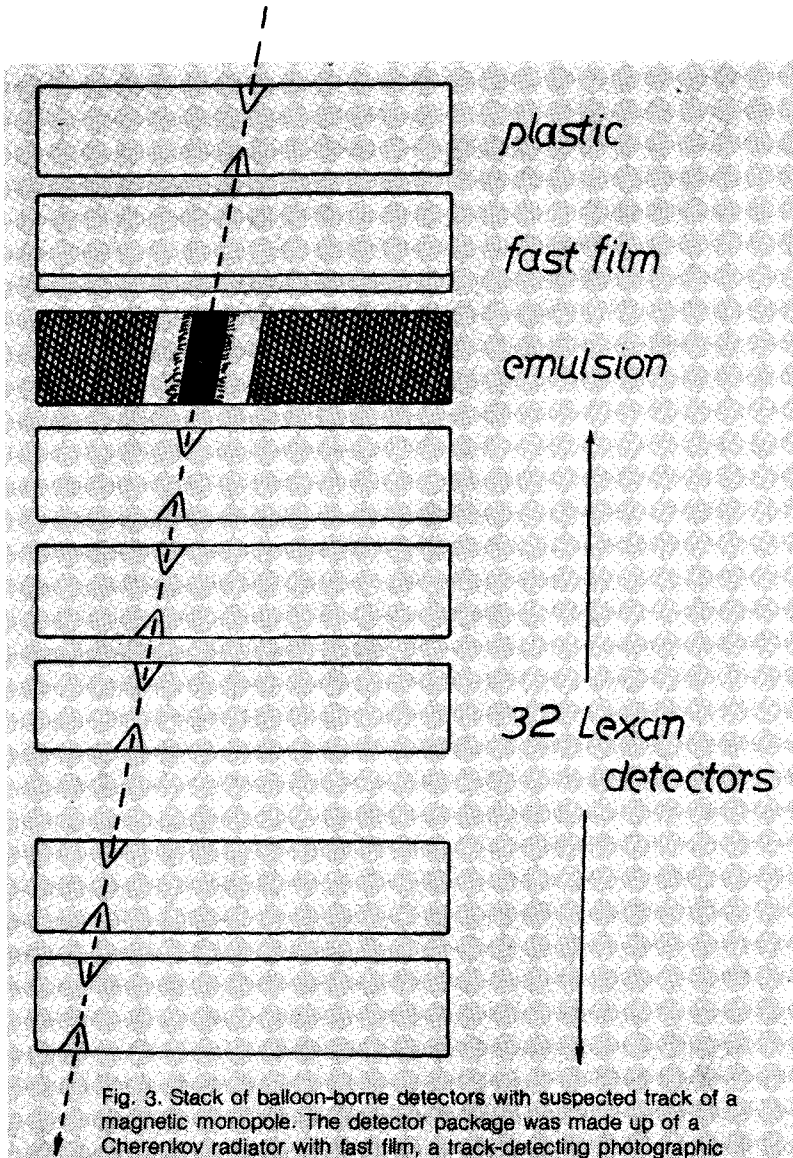

Fig. 3. Stack of balloon-borne detectors with suspected track of a magnetic monopole. The detector package was made up of a Cherenkov radiator with fast film, a track-detecting photographic emulsion and a stack of 32 Lexan plastic sheets. The monopole which passed through is said to have been traveling downwards towards the earth at half the speed of light.

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have to be more massive than 1,000 protons in order to get through all that material without visibly slowing down, and such particles simply don't exist in our world.

As was mentioned earlier, the Berkeley-Houston team's announcement has met with skepticism on the part of some physicists, among them a number who have previously and unsuccessfully searched for monopoles. The focal point of the criticism is that it hasn't been demonstrated that this single event is *not* a fragmenting nucleus or an ultra-heavy cosmic ray nucleus mimicking a monopole's behavior. Until such explanations are eliminated, say the antagonists, no one can say with certainty a monopole has been found.

At issue in the fragmenting-nucleus debate is the velocity at which the particle traveled through the Lexan sheets. Essentially, the idea here is that a platinum nucleus (with atomic number 78) entered the sheets and during its trip through the plastic, interacted with atoms in the plastic on two separate occasions. In the first glancing collision, it transformed into a lesser-charged osmium nucleus; in the second, into a tantalum nucleus. Since the nucleus lost charge during the transformation, this, presumably, would account for the uniform track density. (Recall that an electrically-charged particle ought to leave a thicker track as it slows down.) If the Berkeley-Houston team can establish beyond a doubt that the particle definitely traveled through the sheets with a velocity half that of light, the fragmenting-nucleus hypothesis must be discarded.

Another alternative explanation is that the track is one of an ultra-heavy, cosmic-ray nucleus that got through without interacting. Such nuclei with atomic numbers over 30 are rare in cosmic rays, so rare that we didn't know of their existence until 1965, when fossil cosmic-ray tracks were first seen in meteorites. If the Berkeley-Houston particle were such a nucleus, it would have an atomic number of 96 and would have been traveling not at half, but at three quarters the speed of light. Such a nucleus would, in itself, be a spectacular-enough finding, for a nucleus with an atomic number of 96 is unstable. Only nuclei with atomic numbers up to 92 are found in nature.

As is perhaps clear from this brief summary, the debate about whether the Berkeley-Houston track is indeed that of a monopole is still going on. It may take some time yet before we really know what actually happened.

Other debates are meanwhile in progress. One intriguing question is whether monopoles might not come in more than one variety. Why, in fact, couldn't there be whole families of monopoles, just as there are whole families of electrically-

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charged particles? This is at one and the same time an exciting and frightening prospect. For we already have an unmanageable elementary-particle zoo of ordinary electrical particles. One way out is perhaps that suggested by Julian Schwinger of Harvard. He has tried to bring order into the chaotic particle world by proposing "dyons," fundamental building-block particles bearing both magnetic and electric charges.

This idea has recently become all the more interesting with the mathematical discovery of solutions of certain (classical) field equations which *demand* the existence of a monopole—perhaps even a dyon—and a very heavy one at that. (Remember that Dirac only said there was a hole that could be filled by a magnetic monopole, but no requirement that it exist.) It remains to be seen, of course, if the field equations involved here have anything to do with describing the real world.

Yet another question is whether it is possible to build up magnetic atoms analogous to the electric atoms which comprise the world about us. Such an atom would consist of a "north" monopole and a "south" one, which combined since "opposites attract." The result would be an atom something like "positronium," a stable electrical atom more or less like the simplest of all atoms, the hydrogen atom. The positively-charged particle in positronium is not, say, the proton, but the electron's antiparticle, the positron. Positronium does not, however, fit the classical picture of a hydrogen atom with an electron circling the nucleus (e.g., a proton) in a fixed orbit. Rather, the positron and electron circle each other like a pair of wary prize fighters. Eventually, after some time, because they are each other's antiparticle, they annihilate each other, turning into pure electromagnetic energy (the photons of light).

In the magnetic-atom case there would be some interesting differences. Quantum mechanics tells us that electrical atoms exist because electrons are able to orbit the nucleus in a number of stable orbits of a size fixed by the electron mass and the fine structure constant. But because the force of attraction between two oppositely-charged monopoles is so very much larger than between two oppositely-charged electrical particles, the formation of a magnetic atom would involve a tremendous release of energy (in the form of emitted light). The size of the atom would, moreover, be very small, compared with electric atoms. Further, if the "north" and "south" monopoles involved are each other's antiparticles, being so closely coupled, they would almost immediately annihilate each other, producing even more light energy. Thus, say some, any magnetic hydrogen atom formed in the Big Bang would long ago have col-

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lapsed. But annihilation of such atoms, goes one theory, may still be taking place in quasars, and this is one possible explanation for the tremendous energy that these peculiar astronomical objects emit.

Admittedly, this discussion of magnetic atoms may be a bit premature, for, to build an atom, one needs two monopoles. At best, we now have one. The search has, in fact, been described as "the search for *a* monopole." One monopole is all that is needed to establish the existence of the breed and, in so doing, to explain why photons are massless, why quarks don't exist and why electrical charge comes in small discrete packets.

In the meantime, we are left to dream about what we could do with magnetic monopoles—if they exist and if we can trap them and turn them to our own purpose. There are two obvious ways in which monopoles act uniquely: one is the acceleration in a magnetic field and the other is the high uniform ionization energy deposited as the monopole slows down in matter.

Dealing with the latter first, it has been suggested that a magnetic monopole would make a precise "surgeons' scalpel" for the treatment of cancerous tumors. A single monopole could be guided by an appropriate magnetic field to the location of the tumor, then jiggled around there for a sufficient amount of time, ionizing and destroying the bad tissues without harming the nearby healthy tissues. Then out—zip—without even the necessity of having to sew the patient up!

Another application of ionization might be as a means of heating up a plasma in a thermonuclear reactor, the ultimate energy source available to mankind (and any other intelligent species). Our present-day efforts in controlling thermonuclear reactions (short of making an H-bomb) are hampered by problems in getting the deuterium-tritium plasma hot enough to react. (It must be almost as hot as the interior of the sun.) For many of the circular or linear machines now under consideration, the addition of a few monopoles to the plasma might help get the temperature up there, without affecting adversely any of the other technical conditions needed for economic production of useful energy from fusion reactions.

The other aspect, acceleration in a magnetic field, may be even more spectacular in its applications. In fact, given one monopole, we could use it to build a not-very-expensive particle accelerator—very much more powerful than anything we have today—and this accelerator might then be able to produce, breed, more monopoles. A superconducting solenoid the length of the two-mile-long Stanford linear accelerator could accelerate a

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monopole to over a million GeV. If monopoles are 600 times as heavy as protons, then this is just the energy needed to produce more monopoles.

Perhaps the most useful way of exploiting the newly-produced monopoles would be in the building of small, but efficient, electrical motors. A monopole-driven motor might, in analogy to an electric induction motor, be pictured as a monopole attached to a crank handle (a rotor), that is subjected to a rotating magnetic field perpendicular to its axis.

Such motors, besides all the usual uses, might be the power source for a new kind of transportation system. With superconducting magnetic "rails," an almost friction-free kind of "airtrain" would be conceivable. Possibly the trainside half of the magnetic levitation system could even be based directly on monopoles.

Monopole travel is not, moreover, limited to monopole motors. For the more adventuresome, there are a number of opportunities for one-way trips. One might, for example, outfit an ocean liner with a sufficient number of monopoles and let the earth's magnetic field tug it across the ocean. If the monopoles carry a "north" charge, the ship could travel from north to south. There it would have to be supplied with "south" monopoles, to return to its starting point. The obvious trouble with such a plan is the difficulty of east-west travel and the accumulation of "wrong sign poles" at the various ports of call. Also, we could perhaps someday deplete the energy in the earth's magnetic field, but that day would be a long way off.

Along these same lines, interstellar space ships might be powered by monopoles, launched by using the earth's magnetic field as a "catapult," and then coast down the intergalactic magnetic field lines. Such a ship could explore the galaxy, carrying only enough power to control the spacecraft and, eventually, to stop it when a suitable landing site is found. (This presumes that the energy needed to warm and feed the occupants is negligible in comparison.) The space explorers' destination would be largely in the hands of the magnetic gods, however, and the chances of their grandchildren returning to the Old Country would be small. Unless, of course, the new society were able to build an accelerator capable of making monopoles of the opposite charge. ■

In times to come

"Chimera," by Bob Buckley, will lead off our December issue. It's a look at how we will someday terraform the planet Venus, while living in Venus' cloudy, storm-racked atmosphere. Also, stories by Randall Garrett, P. J. Plauger, Gordon Eklund, and more.

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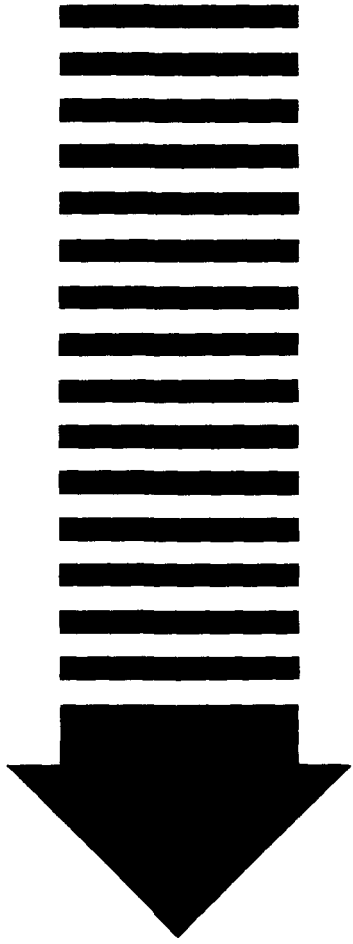

The Asimov Effect

Heytesbury House,
Warminster, Wilts,
England

Dr. I. Asimov,
c/o Analog SF/SF
New York

Dear Dr. Asimov,

I have recently been reading some of your earlier work which has been reprinted[1], and pride myself on having been able (thanks to attendance of various rapid-reading courses[2]) to assimilate the greater part of your literary output.[3] In the work at present under discussion[1], I was particularly interested in your paper[4] on the properties of thiotimoline. However, I note that in this paper you make no reference to the later work[5] which has been carried out on the stereochemistry of this compound; the work of Spritz, Hengstl and co-workers has been recently confirmed by the findings of Zhnidarskaya and Berezhnovodskii[6]. In these papers[5,6] conclusive proof is presented that the anomalous properties of the substance are largely a result of steric hindrance effects during formation of the molecule causing a number of the attached hydroxyl groups to be extruded into the future, giving rise to the parachronic

George Sassoon

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solution (or Asimov) Effect. Psarokinetikos and Panagiobouzoukis[7] have recently reported a strong imaginary component in the measured molecular weight which lends support to this view.

However, it is probable that at the time of publication of the original reference[4], the thiotimoline-assisted typewriter[8] had not yet been developed. Since the introduction of this invaluable device, authors have been able to include in their bibliographies references to papers published up to fifty years in the future; this has been a development of inestimable value to later researchers, since it eliminates the necessity of scanning recent issues of the journals in search of papers on the topic of interest. However, a by-product of this development has been a bibliographical explosion[9]; many authors, secure in the knowledge that none of the references they cite can be checked for a number of years, have been tempted to include citations of papers published in obscure or non-existent[10] journals, in the hope that a thiotimoline-based technique will in due course be developed which will force them into existence. Likewise, many have sought to avoid criticism of their work by the use of papers in unknown or invented[11] languages, while at the same time others have attempted to lend weight to their conclusions by padding their lists with references to papers on totally irrelevant subjects[12]. The ultimate development has been, of course, the textless paper. Here[13], the author merely cites a list of works which he has read, and from which he has drawn certain conclusions. It is assumed that any intelligent reader, reading the same papers in the order cited, will arrive at the same conclusions, so that any text is superfluous.

These developments are being pushed by advanced workers[14] to their logical conclusion, in which the bibliography becomes an art form, the author merely seeking to amuse or titillate his readers with an incongruous juxtaposition of names, initials, titles, journals, and dates[15], without seriously suggesting that the reader attempt to peruse the works cited. Certain carping critics[16] have insinuated that these developments have resulted in a decline in serious scientific publication; if such a trivial objection were worthy of answer, it would only be necessary to point out that the new discipline of Bibliographics is now considered to be the sole science worthy of serious study.[17,18]

With best wishes,
Yours sincerely,
George Sassoon

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get the lead out

A good sailor may be loyal— but not reverent!

Sam Nicholson

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As a seaman, man and boy, I figured I had sailed aboard every type of ship, but old Mickleberry in Operations gave me a jolt when he said he was recommending me as skipper on a nuclear vessel.

It was mid-afternoon, in his office. I thought somebody had been spiking his martinis at the Athletic Club. The nuclear *Savannah* had made a promising start, but union trouble, exorbitant wage demands, and radiation hysteria had scuttled commercial use of nuclear power at sea.

On the off chance that Mickleberry was sober, and remembering that the *Savannah*'s personnel had studied three and a half years under the supervision of the Atomic Energy Commission, I asked, "When does the job start?"

He picked up an airline folder. "You're cleared through to Basra on tonight's flight. A Qamat plane will meet you on arrival."

I searched through my mental atlas. Qamat was a small sheikdom south of Kuwait on the Persian Gulf. I had loaded oil there but had not got beyond the steel-fenced dock area. Qamat was fanatically Moslem and was closed to foreigners. In some surprise I asked, "Have the Qamatis a nuclear ship?"

Mickleberry allowed a smile on his parchment mouth. "A few years ago Sheik Ahmed was up to his neck in cheap oil. Now he has more money than he can spend. Among his first purchases were a lab of American physicists and a Japanese shipyard. He has just taken delivery of the world's only nuclear-powered yacht."

"Sounds dicey to me," I commented. "The Japs tried a couple nuclear cargo vessels last year, and, according to the newspapers, they sprayed radiation like a leaky hose nozzle. How does the Company come into it, anyhow? Qamat has a bunch of Scandihoovians running its supply ships."

"Apparently the present officers do not meet specifications. Sheik Ahmed was a Harvard classmate of Mr. Bennington—" a salaam in the direction of the Boardroom, "—and has asked him for the loan of a master mariner. Since a courtesy reduction in the price of bunkers oil was mentioned—"

"An under-the-table deal, hey? Why me? You guys fire me every time I open my yap."

His thin nose quivered. "Personally, Captain Schuster, I would send you to a hotter place than Qamat. However, your—uh—outrageous resilience was a factor in Mr. Bennington's decision."

He held out the airline folder. As I accepted it he added, "Watch your step. Sheik Ahmed is not a typical Harvard man."

"Fine. Maybe I'll be able to tell him something."

Mickleberry coughed. "Good day, captain. Safe voyage."

On the flight to Basra I was too

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preoccupied to do my usual grousing about triple-seat leg cramp and cabin headache. Atomic power and civilian shipping were like oil and water. I felt that the physicists were mostly to blame.

Radiation danger was not the basic stumbling block. Statistically nuclear power had a remarkably safe record. It was flogged-up alchemist *mystique* that scared authorities into closing seaports. Shades of alchemist glory had inspired seamen to demand astronomical sums for routine work.

If you want a statistically lethal energy source, in contrast to atoms, take North Sea natural gas. At regular intervals it blasts a street in England or Scotland to matchsticks. Does anybody squawk? Of course not. They scrape up the bodies, fill in the bomb holes, and a guy in blue overalls and a cloth cap reconnects the pipes.

The gas inspector is a regular Joe, like you or me. The guy who pokes rods in and out of a reactor pile is a white-coated Superman. A sorcerer's apprentice.

I blamed the physicists for more than the *mystique*. I had been waiting maybe twenty years for a bucket-seat sports car that refueled biannually. Nuclear power plants and Naval vessels were great, but where were the consumer items?

The usual answer was: hung up on the problem of shielding. But the hang-up had lasted so long that I suspected atomic theory was hardening into dogma. Research is like glue. Unless you apply it when it is fresh, it hardens and only makes more work for the next guy.

As for shielding, I had a couple ideas on that score, myself. Why the hell nobody had picked up that old Rutherford experiment—!

At Basra I assumed I would be transferring to one of the thirty-year-old DC 4's that still spin their props in remote areas, but I was directed to a sad-eyed little Arab in a black suit.

He bowed and said, "I am Hassan. His Excellency sends a plane."

I thanked him. He latched onto my suitcase and led me to a white-and-gold VIP Cessna. In guard-formation at the boarding steps were four human hawks swathed in white burnooses, the hoods thrown back to show gold-corded white head-scarves. Lashed over the burnooses were cartridge-ribbed bandoliers and rifles.

Had I been the sheik, I would not have trusted those cold-eyed thugs with a bean shooter. I ignored them and boarded the plane. It was like a private club car, except that gold gleamed where aluminum or brass usually sufficed.

We strapped into the roomy chairs. Hassan spoke into a hand mike, the pilot revved up and we eased into the traffic pattern. When we were airborne a steward came with a tray of scotch-and-soda for me and cokes for the Arabs. I asked Hassan,

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"What size is the yacht? Who brought her around from Japan?"

"She is three hundred feet long, captain. She came under tow. The Japanese would not allow atomic sailing. During long stretches at sea, of course, the ship was under her own power, and the scientists have certified that she is in order."

A thought occurred to me. "Who are the engine crew?"

He looked surprised. "His Excellency's two chief physicists and their staff. They are not your concern, captain."

That was what he thought. I had no intention of sharing my command with court alchemists or allowing a caste division on board.

Having followed the Gulf's west coast, the plane sat down on Qamat's white-dust landing strip. A jeep took me to the steel-fenced dock area, bypassing the town.

The ship was good-looking, I had to admit. Brilliant white. Flared bow, low-profile streamlined deckhouse. A red-carpeted gangway led up to a sideport you could drive a camel through.

The white-uniformed third mate was lounging in the air-conditioned jet stream at the top of the gangway. He straightened up as I approached with the jeep driver lugging my suitcase after me.

Before the officer could speak, a bulky sunburned man wearing a flowered sports shirt over gray shorts came forward, shook my hand and said, "Welcome to the club, captain. I'm Beckwith."

In almost the same motion he took a small namecard from his pocket and hooked it into my lapel. I saw that he, the third mate and the seaman taking my suitcase from the jeep driver had similar cards.

I knew the blank film under the name was a radiation monitor, but I growled, "What's this? An Elks' Convention?"

I saw the officer's face brighten. Beckwith stared at me. He began, "But, Captain Schuster, a safety precaution—"

"Yeah, yeah. How much radiation did she leak from Japan?"

"Leak? Why, none. The Japs did a superb job. But, of course—"

"You've got a dozen monitors on every deck, right? Is a guy's lapel gonna register anything more? If the ship is seaworthy, she's seaworthy. If she's not, we'll all get off instead of playing with a pack of cards.

"The sea always has had hazards," I went on, "but crewmen and passengers don't wear life jackets the whole damned time a ship sails, do they? The airlines lose a plane now and then, but a fat lot of business they'd get if every passenger had to wear a parachute.

"When are you atom scouts gonna grow up?" I pursued. "Safety is one thing. Mumbo jumbo is something else. This is not a lab or a club, but a ship. If you're not clear about that point

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now, mister, you'll be clear after I get through with you."

Before he could hinge his jaw up again I told the third mate, "If the chief mate is aboard, I want to see him in my office."

I barged after the seaman, trying not to look impressed as he led me through the deep-carpeted alleyways. The interior of the ship was what Paradise would be, if Nieman-Marcus was furnishing it.

My quarters were a piece of the whole. The office/dayroom stretched from Monday to Friday, and the bathroom had gold where there usually was chrome.

I changed from my shore suit to khakis. When I came from the bedroom I saw that Beckwith had brought the other chief alchemist into the dayroom. The two were standing on the middle of the bulkhead-to-bulkhead Sarouk.

The second chief kinda interested me. He looked fresh and quick. He had tousled sandy hair, grainy cheeks and broad hands. He wore a seersucker suit that was fifteen years old, and his glance put a question mark on everything. It asked, "What if—?" His radiation card was labeled Winters.

Beckwith was preparing to sound off, but I said mildly, "Sit down, gentlemen. Mr. Beckwith, you thought I was pretty rough, didn't you? With crewmen present, I had to slam you down hard. When I give an order from the bridge, I can't have a man answer, 'Wait till we check with the scientists.' "

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Beckwith seemed easier in his mind. Winters looked like a terrier cocking an ear at a ball game.

Beckwith began, lowering his bulk to the settee, "Captain Schuster, it's obvious you have had no briefing for this job."

"Briefing how? To me, that atomic pile is nothing but a power source for steam turbines, which I have encountered before. I don't give a damn what stokes the furnace—coal, oil or radioactive pellets.

"It's about time the atomic establishment recognized the three phases of any invention: Creation, which takes genius; construction and repair, which take training;

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and everyday use, which takes only enough brains to push knob A while keeping the mitts off lever C.

"Henry Ford and his ilk were geniuses. The guy who repairs auto transmissions is a trained mechanic. Any ten-year-old kid can get behind the wheel and drive. That's exactly the way an invention ought to progress to be of any use. If every automobile had to come equipped with a graduate engineer, we'd all still be shoveling manure."

Beckwith blustered, "That's the wildest exaggeration I ever heard!"

"Stick around. You've only known me five minutes."

There was a knock at the open dayroom door, and a rangy rawboned man came in. He was wearing khakis and had an envelope in his fist.

"Torgessen, chief mate," he said in a closemouthed manner.

He had shoulders like a blacksmith and arms like a boilermaker. I had sailed with his sturdy type before. He was a squarehead who shipped out from November to April and farmed potatoes the rest of the year.

He handed over the envelope. I took it and told him to sit down.

Somewhat hesitantly he sat near the scientists. I opened the gold-monogrammed envelope. In a handwritten letter Sheik Ahmed was informing me that he would be boarding the vessel at 0800 the next morning for the shakedown cruise.

I passed the order along to my guests and asked Torgessen if he had been aboard from Japan.

"No, captain," he answered. "We were hired later. The tugboat company had their own men on the bridge. But I spoke to the tugboat captain at the dock canteen, after the ship arrived, and he said she was very stiff despite the stabilizers and tended to broach with a following sea. He said if you couldn't hold her to the wind in a heavy blow, you'd be in trouble."

"That damned shielding!" I muttered. "If it's up to the *Savannah*'s standard, there's a thousand tons of lead and cement putting the ship out of whack."

I turned to Beckwith. "If you whizbangs would stop repeating rituals and take another look at that simple experiment by Rutherford—"

Winters recocked his ear. Beckwith opened his mouth, but I said, "Later. If we're sailing tomorrow, we have more to do than chew the fat." I asked Torgessen, "Ordered any boat drills?"

He rubbed his hand over his graying head. "No, sir. Only the deckhands are seamen. The Steward's department are Arabs and don't understand what we tell them. And the engineers—" he looked doubtfully at the physicists "—don't take orders."

"We'll see about that. Go up to the bridge and ring the alarm."

He left the dayroom. The physicists looked comfortably amused. I

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said, "I'm not kidding. Report to your boat stations. The sea is still bigger than all of us."

Beckwith flared up, but Winters towed him away.

The alarm clanged its raucous signal. I went up to the bridge and looked down from the wing. There had not been so much chaos since the Six-Day War. The locally-recruited messmen and cooks ran out of their sandals getting ashore. The European seamen straggled to their stations, and the alchemy staff flapped around the decks.

I said to Torgessen, "We'll repeat the drill until it goes smoothly, if it takes us all night."

It nearly did, at that. Before we started we had to send a party ashore to shanghai the native crewmen. Most of them had legged it all the way to town and had to be pried out by the constabulary.

Still, by 0800 the next morning I figured we had a passably disciplined crew for Sheik Ahmed's inspection. I was wearing my least wrinkled whites and was hoping my face did not show my opinion of Harvard men.

We were ready to cast off, the line-handlers at their stations, the quartermaster behind the wheel and the third mate on the bridge. From the bridge wing I could see a motor procession raising dust on the way from the town.

Two jeeps loaded with soldiers were fore and aft of a solid-gold Rolls Royce. On the dock the Rolls swerved alongside and the jeeps closed ranks between the Rolls and the spectators in the canteen area.

The vehicles braked with a flourish. The four guardsmen piled out of a jeep and lined up at the rear door of the Rolls, which opened to emit Hassan. He proceeded up the red carpet. Finding no booby traps, he turned and bowed. A guardsman swung the Rolls door wide. The sheik stepped out and stood motionless.

Sheik Ahmed was in native robes, tall and ramrod-straight. Against the white of his flowing head scarf, his face was strikingly dark and sharply modeled. From where I stood, he looked in the prime of life, though he would have to be over fifty if he had been a classmate of Bennington.

A small curved sword hung on a wide belt under his burnoose. When he moved, the dazzle of gems on the belt, sword hilt and scabbard nearly knocked my eyes out. In the morning sunlight the jewel facets blazed like a welding torch.

Looking neither right nor left Sheik Ahmed strode up the red carpet, his bodyguard falling behind. At the top of the gangway he gave an order. Two of the guards bowed and retired. The other two exchanged a look, threw themselves on their knees and emoted as only Arabs can emote.

I watched them wailing and pointing to the ship. I thought, *Uh-*

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oh. Any time a couple privates volunteer for duty, they're up to no good.

Hassan now added his palm-raised entreaties. The sheik assented and the party disappeared into the ship. I walkie-talkied the second mate to close the sideport.

In a few seconds Sheik Ahmed strode onto the bridge alone. He paused, gave me a short nod. "Captain Schuster." I drew myself to attention and responded, "Sir." He smiled, ordered, "Cast off the lines," and we were in business.

I had no complaints about the way the ship handled in calm water. The bridge had every instrument I needed, plus some I would not have installed on a bet, like the true-position radar. I knew my true position and course. I did not need it repeated on an instrument.

We could have done 30 knots without exerting ourselves, but we took a full day to mosey down the Persian Gulf and turn the other sheiks green with envy. I was enjoying myself, except for my mistrust of the two guards. At our exclusive supper that first night in his dining room, I said to the sheik,

"You know your own men best, of course, but generally it's a mistake to allow weapons aboard."

He looked up from his shrimp cocktail. "As you probably saw, captain, I dismissed the men. But Auda and Ali have been with me since they were boys. They are feudal in their loyalty. The ship represented a danger they would not let me enter alone."

I thought *Oh, yeah?* but I did not pursue the matter further.

All day an escort of various boats had trailed after us, at distances which accorded with the owners' radiation fears. They came out to look us over and turned back after their curiosity was satisfied. Both Torgessen and I noticed, however, that one powerful motor launch had been pacing us since Qamat. He asked,

"Who can it be? News media or Russians?"

I thought either possibility was unlikely. "The media would be coming alongside for an interview, and this yacht has nothing to interest the Russians."

The next day we turned south in the Arabian Sea. There was no wind or swell of any consequence, but the ship began a fast, jerky roll. As far as I could, I quartered the waves. We had no particular destination, and I could adjust the ship to the sea.

The launch continued to pace us, just below our visible horizon but keeping a constant distance on the radar screen. I began to get leery. To follow us beyond the Gulf, he must have stowed considerable extra fuel aboard.

In the late afternoon I pushed the yacht to 30 knots. The launch slowly began to close the distance. The ship was steering on the gyro,

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and there was no quartermaster in the wheelhouse. At that moment except for Sheik Ahmed I was alone.

Ahmed had been on the bridge most of the time, after one escorted tour to the white-banked nuclear pit. Beckwith pussyfooted around down there like a high priest before an altar, but for my money the place was as exciting as an empty swimming pool. Equipment is only equipment. If it works, use it. If it don't work, scrap it.

When I saw that the launch did not mean to be outrun, I said to the sheik, "We can continue south at full speed and possibly exhaust his fuel, or we can turn and chase him down."

Ahmed drummed his steely fingers on his jeweled sword hilt. "Why did he wait so long to overtake?"

"We're out of the main traffic stream. Maybe that's—"

I heard a startled "Hey!" from the chartroom, where Torgessen was plotting our position. A scuffle. Torgessen came out with two rifles at his back. Ali and Auda were on the operative ends of the rifles.

One guard left Torgessen and prodded his rifle against Ahmed's chest. I thought, *So much for Feudal Loyalty.* The guard said to me,

"I want the fuel pellets, in a shielded container. Also, the money in the ship's safe. You will do it thus. You will ring a boat drill."

He paused to give me a hyena's grin. "You have perfected all crewmen in the boat drill. While they are on the outside decks at their stations, you and Ali will descend and obtain the fuel. Then you will help us to board our launch."

I had a millisecond to decide whether to go along or run a bluff. I looked at the fierce contempt on Ahmed's face and chanced the bluff. I knew Torgessen would catch on and follow through.

"Okay, okay, you can have the damned pellets," I growled. I walked boldly to the heat-and-smoke sensors and clicked a switch.

"What's that?" demanded the guard, by deduction Auda.

"You want a boat drill, don't you?" I barked. "My God, this is a

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nuclear ship! You can't have a boat drill at full speed! Do you want us to blow from here to Karachi?"

I continued along the consoles, going Flick, Press, Shift as I passed the instruments. The guards looked nervous, awed, unsuspecting. The nuclear *mystique* had its uses, after all.

When I came to the gyro pilot I reached down briskly and released the gear. In the same second I grabbed the wheel and pulled it a quarter turn.

As the shielding-weighted ship broadsided the waves, she gave a sharp lurch. The guards were jerked off their feet.

Torgessen had been braced for the stunt since the moment I had clicked the sensor switch. He hooked a size 12 brogue around Ali's sandal as he made a flying tackle that pinned Auda to the deck.

In that half-second, while both sprawling hijackers were scrambling to bring their rifles to bear, Ahmed drew his sword. It flashed twice like summer lightning, and two heads bounced like bowling balls with the roll of the ship. The headless bodies spouted red lava over the deck.

Torgessen turned greenish-yellow and shuddered to his feet as a head wobbled into his lap. I said quickly, "Mate, set the course and instruments again."

He pulled himself to the gyro pilot and held onto the wheel a moment before correcting the course. I looked at Ahmed. The feudal anger of a double-crossed despot was giving way to afterthoughts even more dangerous for anyone presuming to criticize. As he met my gaze his nostrils flared and his grip tightened on the sword hilt.

He was daring me to say something, so of course I said it. "If you mess up my clean decks that way again, I'll throw you off the ship, Harvard or no Harvard, so help me!"

The fierceness became absolutely blank. He lowered the smeared sword, threw back his head and shouted a laugh.

"Bennington warned me about you," he chortled, his eyes glinting, "but he didn't tell the half of it."

Whatever that was supposed to mean. He went on, "I'll send Hassan to jettison the bodies and clean up. In case he needs an object lesson. Come to my cabin as soon as you are free."

He wiped his sword on his burnoose, sheathed it and strode off the bridge. I said to Torgessen, who was still doggedly setting switches, "Go below and take a whiskey. I'll hold the fort."

He mumbled thanks and hurried away. I chose a couple flags at random from the flag locker and covered the bodies, retrieving the heads and assigning one to each. The wrong one, probably.

I saw on the radar that the launch was coming all-out to catch

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us. I reduced speed. They would be coming alongside just when Hassan would be heaving their buddies overboard. I figured they needed an object lesson, too.

In a few minutes Torgessen returned, in a clean uniform and with a healthier color on his face. I went to my quarters and knocked back a half glass of scotch. To be honest, I had not liked those rolling heads any better than Torgessen had. After changing my spattered clothes I went to the sheik's cabin.

He was immaculate and dazzling again. He told me to sit down and asked me what I was drinking. I said scotch, and he took drink fixings from a gold-trimmed mahogany cabinet.

"When I asked Bennington for a troubleshooter," he smiled, "I didn't foresee that kind of trouble."

"Frankly, there's no need for me here," I replied. "Torgessen can handle the ship just as well. He understands the structural defects. The only thing I would like to persuade you to accomplish is to replace Beckwith's staff with seamen.

"There's too much exaggerated complexity about nuclear power," I went on. "Seamen went easily from rigging sails to stoking coal to being oilers and motormen. They can go just as easily to packing pellets into steel tubes.

"Sheik, you have no union problem in Qamat. You can train men in a straightforward manner, as they are trained on Naval ships, and assign them to jobs without being pressured into paying them ten times what the job is worth."

"Winters has asked to be released so that he can go back to research," said Ahmed. "I'll bring a chief engineer from one of the supply ships and have Beckwith train him for Winters' place.

"But I hope you'll stay on for the rest of the season, captain. I want you to take the ship around Africa to the Mediterranean—Monaco."

"Rainier is not gonna let you within fifty miles of his gambling den," I predicted.

We puttered around the Arabian Sea for a week and returned to Qamat. Winters resigned from the ship, but he came to my quarters one evening before he went ashore. He sat on the dayroom settee, his eyes asking "What if—?" as he looked at me.

"Captain," he said, "you expressed an idea about shielding. What was it?"

With that keen terrier cocking an ear at me, the idea suddenly did not seem so hot. But I began,

"I wanta explain why I thought of it. In my experience the first solution to a technical problem is seldom the best. If it were, aviation would not have got beyond the Curtiss Jenny.

"But a wrong solution can persist a hell of a long time. Take my own field. For centuries—millennia—the

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dummies hung square sails athwart the ship and could sail only before the wind. In the last breath of the sailing ship's history, some genius rigged a ship fore-and-aft, so she could tack.

"It may take millennia before the lead-shielding syndrome is licked. But I think the answer was already given at the turn of the century when Rutherford found that a magnet could divert the radiation from a piece of radium. That basic experiment has been used for doing what-all to radiation—except disposing of it."

I fumbled to explain better. "Look. It's like a rancher building a three-foot-thick wall around his spread to stop stampedes, when all he has to do is get on a horse, turn the direction of the stampede and get the critters milling in a circle."

Winters said smoothly, "Superconducting magnets could be light enough and strong enough to deflect the alpha and beta particles, but gamma radiation is electromagnetic energy and not bendable by magnetic fields."

"Okay, so gamma rays can't be bent. But don't talk as if that was the final word! A few giants did some basic work in the field, and you guys are resting on their laurels. How do you know for sure that magnetic fields can't be rigged to weaken or damp down or block out gamma radiation? Has anybody done serious work in that direction?"

"Calm down, captain! Don't blow a fuse," he smiled. "All right, let's assume the gamma radiation could somehow be blocked. What would you do with all those milling particles?"

"Aw, have a heart!" I protested. "If I was that smart, I wouldn't have to work at sea!"

Winters laughed as Ahmed had done. When he could listen to me again, I said, "The important thing is—"

He grinned. "The important thing is to get the lead out."

Winters was an inventor. Beckwith was an ossifier.

As I had warned the sheik, we were not allowed in any Mediterranean port. We only barely snuck past Gibraltar. We had plenty of company on board, though, as the yachts of millionaires and ex-crowned heads came out to us. It was a rich mixture for me, but I had a good time. Once in a while at dinner I grabbed the wrong fork, but otherwise I figured I was a credit to the Company.

At the end of the season I quit the sheik and returned to New York with a nice bonus check in my pocket. I was feeling on top of the world, but Mickleberry was as crabby as ever. He asked me,

"After your term of service aboard a nuclear vessel, Captain Schuster, does E still equal mc^2?"

"Why, sure," I told him. "For the time being, anyhow." ■

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UFOs are real, all right. It's some of the IFOs that are phony!

unidentified fraudulent objects

James E. Oberg

The first contact between human beings and alien civilizations is a major topic in science fiction. It has been a fruitful theme for stories and novels about Martians, Moties, and manifold other creatures.

Many observers today believe that such contact has already taken place on earth, or in space near the earth. The "extraterrestrial hypothesis" of UFOs claims that they are spacecraft from other worlds.

Hardly a UFO book or movie fails to point out that "astronauts have seen them too." If the tens of thousands of earthbound witnesses and photographs may be questionable, at least (so these advocates maintain) the space reports are reliable.

The "astronaut sightings" provide a challenging controlled case study in UFO methodology. A researcher should be able to determine all the variables, obtain extensive transcripts and verified photographs, and observe the behavior and techniques of previous researchers.

I have been interested in space mysteries for a long time. This phenomenon was intriguing, but I refrained from serious work because I felt certain that the field had already been adequately covered by the "UFO believers" and the University of Colorado ("Condon Committee") investigators. My unique background in computer science, Air Force operations, astronautics, and historical research did not seem to promise any additional insights.

But after an initial investigation earlier this year, I changed my mind. After three further months of intensive effort, I came to some startling and eye-opening conclusions, conclusions never before seen in print. Compelling evidence has accumulated to convince me

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of the truth of the following:

1. There are *no* "astronaut UFO sightings." All reported cases have been or can be readily identified as entirely prosaic events.

2. Previous research efforts have been conducted with individuals clearly lacking the proper credentials, experience, and insight to penetrate the 'mystery'.

3. A number of specific individuals in this country and overseas have been the main source of the persistent published reports of "astronaut UFO sightings," in absolute variance with facts known to themselves but withheld from the general public. Evidence has been altered, omitted, or fabricated to support a myth.

My research furthermore revealed carelessness, gullibility, and distortions on the part of respected UFO research groups such as MUFON (the "Mutual UFO Network"), APRO (the "Aerial Phenomena Research Organization"), NICAP (the "National Investigations Committee on Aerial Phenomena"), and the Center for UFO Studies. One may certainly hope that these groups, and the hundreds of hardworking, dedicated, and honest members of their investigating teams, have been more careful when it comes to investigating terrestrial UFO sightings!

What is the evidence? Always realizing that it is impossible to "prove a negative," what *can* I prove about the "best cases" of the "astronaut UFO sightings" genre? Is there the slightest suggestion that anything mysterious and unexplainable is involved?

The best cases of the Gemini program (1965-1966) were described by Dr. Franklin Roach of the Condon Committee as a "challenge to the analyst." Despite the man's impressive experience with the space program, one can easily see the gaps which challenged his own powers of analysis. It is also clear that the UFO groups eagerly accepted the "endorsement" of the skeptical Condon Report, which otherwise was seen by many to have been a whitewash of the government's UFO research activities.

Roach, now living in Hawaii, listed the sightings on Gemini-4 and Gemini-7 as practically unsolvable. Other researchers have compiled even longer lists, going back to Mercury-7 (a "domed saucer" in a photograph), Mercury-9 ("radar sighting of a visual target"), Gemini-1 ("four objects tracked by radar for one orbit"), early X-15 flights in 1962, and later Gemini flights including Gemini-10, Gemini-11, and Gemini-12 ("four objects, not stars"). During Apollo, reports were published about Apollo-11 and Apollo-12 being chased on the way to the moon, while the "APRO Bulletin" had to caution its readers that there was no reason to suspect that UFOs had shot down Apollo-13. Skylab photographed more UFOs, in-

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cluding a paddle-shaped object of immense size, a strange reddish framework, and a cigar shaped object which had just buzzed an Army helicopter in Ohio. These, at least, are the published reports.

As with terrestrial reports, an observer may be inclined to agree that "most may be explainable," but that a hard core of cases (perhaps 20%, perhaps 5%, perhaps 1%) are authentic. UFO evidence, unlike the proverbial chain which is as strong as its weakest link, is oddly enough as weak as its strongest link. What this means is that disproving a single case, or almost all cases, proves nothing: there is always one more case which *might* be a true UFO. To demolish that possibility, a skeptic must tackle what the 'believers' consider to be the *best* cases, and show just how good they really are. Up until my research, not a single investigator had done that. After my research (to be published elsewhere in excruciating detail), the "astronaut UFO cases" will never be quite the same.

The Gemini-4 case of Major James McDivitt is by and large the "best" case of the class during fifteen years of Soviet and American manned space flights. A photograph, allegedly taken by the astronaut, has been picked by NICAP as one of the four best UFO photographs ever taken anywhere. The retired astronaut has appeared on numerous TV talk shows, was invited to participate in a 1976 *Playboy* magazine UFO panel, and has recently taken part in a long-playing UFO record album.

Early on the two-man four-day mission in June 1965, McDivitt reported seeing and photographing a cylindrical object with an arm sticking out. It was apparently on collision course with the capsule. Ed White, the copilot, was asleep at the time.

Back on earth, NASA asked the Air Force to check with the North American Air Defense Command (NORAD) space radars in Colorado to see what other satellites were near enough to Gemini-4 to account for the sighting. A computer run came up with a list of a dozen objects, mostly debris. One large satellite, called Pegasus-3, was about a thousand miles away at the time of the sighting, but might have accounted for the report. But it was too far away for the space pilot to have seen the detail which he described.

Upon returning to earth, McDivitt searched through all the films taken on the flight. He could not find the ones he took of the object, a fact which some observers find suspicious.

Shortly thereafter, a photograph appeared in print (I was never able to find out who was first with this accomplishment) which purported to be "McDivitt's UFO." It showed an oval blob of light with a smear over it. NASA said it was a glare

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off a window bolt and smudges on the glass window.

My own research leads me to the inescapable conclusion that McDivitt had caught a glimpse of his own Titan-2 second stage booster which was in a nearby orbit. This hypothesis sounds trivial and even laughable at first (at least, those were my own impressions), with the major objection being the question of why it took so long to prove such an obvious answer. However, many facts have never before been added up, and there have been few people willing to either dig up the facts or to do the adding up. NASA was not concerned, McDivitt was a UFO celebrity, and the UFO groups already had an "official endorsement" of the case and were not interested in further investigation of what they rightly considered one of their most persuasive cases.

Here are the relevent facts, never before published together:

1. McDivitt had been maneuvering around the booster early in the flight in the world's first attempt at a space rendezvous. He broke off the attempt after an unknown amount of success when the capsule fuel ran low.

2. McDivitt continued to see the booster on subsequent revolutions when the orbits of the two satellites (which were nearly parallel) crossed.

3. McDivitt saw his UFO at the same point in the Gemini orbit where he had last seen the booster several hours before.

4. McDivitt had earlier seen the booster at least once but had failed to recognize it due to sun glare. He reported an "unknown object" to Mission Control, only to correct himself moments later when he recognized the characteristic beer-can shape of the booster, metal straps and insulation hanging off it.

5. At a news conference a few days after the flight, McDivitt clearly stated that his UFO looked just like a rocket booster.

6. McDivitt saw the UFO through small Gemini windows (about the angular size of this magazine held at arms length), badly smeared by Ed White's attempts to clean them during his walk in space the previous day.

7. The object drifted across the field of view while the capsule was in a slow tumble, and then was lost in the glare of the sun.

8. McDivitt's observation that the object seemed at first to have been on collision course can only mean one thing to a pilot: it held a constant "angle off," or relative angle of the line of sight. This clearly implies an object in a parallel orbit.

9. McDivitt later complained to flight surgeons that his eyes were very red and teary at this part of the flight. "I didn't think I was going to be able to hack it," McDivitt had reported to earth the following day. A large accidental urine spill a

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few hours before the sighting had not helped his eyesight.

10. The booster did remain in orbit somewhere for at least another day before burning up in the atmosphere, according to NORAD figures.

11. NORAD had been asked to plot an intersection of the Gemini orbit and "other satellites," which was taken to mean "other previously-launched satellites." The booster, which was in a nearby orbit, was *not* on the list of objects supplied to NASA.

12. McDivitt was the first astronaut to attempt to make visual range estimates while in flight. Many of his readings were off by a factor of ten; his experience helped later crewmen be more accurate.

13. Gemini-4 was the first long American manned space mission, and the first on which photography was attempted on a large scale. Exposure settings in space were uncertain, and a very large percentage of Gemini-4 photographs were badly exposed. Many photographs were also apparently taken with the lens caps still in place.

14. McDivitt completely disassociates himself from the "McDivitt UFO" photograph, and reiterates his contention that he never saw anything on film which looked like his UFO. Since he had copies of the film manifests and logs, he was able to determine that he had been shown all film exposed on the flight.

15. McDivitt was never particularly impressed by the UFO, while taking advantage of the opportunities his testimony afforded. He still maintains that it was probably some other man-made object.

Where do these facts leave us when we consider them all? What do they add up to? Where do they leave the "McDivitt UFO?" UFO researchers and writers have been repeating this story for more than a decade without many of these fifteen facts. Where does that leave your trust in them?

Clearly the main mystery is why and how this case ever achieved the notoriety and fame which it did. The mystery is how a major "anti-UFO" study can leave it unsolved, and how a UFO group can pick an overexposed, smudged photograph as one of the "four best UFO photographs ever taken." (Actually, I agree: the photograph is a lousy shot and proves nothing, but it still does qualify as one of the best ever when compared with its competition.)

I naturally expected that McDivitt himself would be curious to see this new development in a puzzle which has been bothering him for a decade, so I sent him an advance copy of the manuscript. In public, he has recently said, "I was never able to find out what it was, and nobody else ever did either." The air of mystery was enhanced by McDivitt's often quoted opinion

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that nobody will ever solve his UFO sighting.

After eight weeks, McDivitt returned my manuscript with a brief and disappointing note. With the time spent on talk shows and records, he did not have time to study the report or offer any comments or criticisms whatsoever. He did "glance through it," wished me luck as a writer, and subtly informed me that he was not interested in any solution to a puzzle which continues to bring him publicity and attention.

Another famous case, recently revived, concerns the Gemini-11 photographs of what NASA identified as the Soviet Union's Proton-3 satellite. NORAD predictions (the computer was projecting forward some sightings made a day earlier) put the Soviet satellite a few hundred miles behind the Gemini over the Indian Ocean on September 12, 1966.

The crew, however, reported an object quite close in. Their photographs show resolvable detail and a large angular size. Therefore, say UFO investigators, the object was "too big to have been at the range of Proton-3, or much closer than Proton-3."

This whole line of reasoning collapses when the actual range is computed. Since the Proton was in the final stages of orbital decay (it burned up 36 hours later), it was running far ahead of its predicted schedule. Once I had obtained several consecutive orbital predictions over the final few days, I was able to determine just how far off the initial NORAD estimates had been: several hundred miles per day. The contradiction between range and size vanished.

Overlooked by the same researchers (either they never saw it and were superficial in their study, or did see it and chose to ignore it) is a visual description of the object given by astronaut Charles "Pete" Conrad. He describes an object which looks like Proton-3, just as Soviet space program analysts in Washington D.C. maintain that the NASA photographs show an object which looks like the Proton satellite. The shape of the Soviet object is known because models are on exhibit in a museum in Moscow, but UFO researchers continue to use an arbitrary and wholly erroneous geometry to 'prove' that the photographs cannot be identified with Proton-3.

If these serious "astronaut UFO reports" are so easily solved (easy only in the sense of obvious solution *once* all the relevent facts have been determined, a process which took more insight and effort than anyone had ever before applied to the problem), what purpose can be served by spending time with the lesser cases? My detailed report treats every one of them in exhaustive precision, but a summary will demonstrate all that can be learned from them.

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On Mercury-7, astronaut Carpenter was photographing a poorly inflated balloon subsatellite ejected from the capsule in an unsuccessful attempt to get visual tracking data. X-15 pilots, like Mercury and Vostok spacemen, were plagued by "fireflies," flaking paint and frozen droplets of fuel and water floating near their spacecraft. The Gemini-12 astronauts were the victims, not of a UFO visit, but of a deliberate misquotation: at the news conference they described how they threw overboard four bags of equipment and saw them a few orbits later. Gordon Cooper saw what he thought was a UFO while he was a fighter pilot in Germany, but in his latest public appearance on the UFO record album with McDivitt, he never mentioned his space flight. The Skylab photos were space debris and a strangely shaped structure on the surface of the earth.

It is immediately obvious that reports of this caliber would not long hold the attention of the news media. There must be some driving force behind it all, some agency which continuously brings "astronaut UFOs" back into the limelight again and again. The evidence may be counterfeit as well as contrived, but it serves to keep the subject in the public mind and to lend credence to the whole UFO phenomenon.

One of the most widely printed astronaut UFO photographs is from the Gemini-7 mission. It shows two octagonal objects with strange luminous force fields glowing beneath them as they fly in formation over the clouded earth hundreds of miles below. It has been widely reprinted in UFO magazines. It has been widely publicized in traveling slide shows given by serious pro-UFO lecturers. The photo is a forgery.

An authentic Gemini-7 space photograph which showed the nose of the spacecraft and sunlight glinting off two roll rocket thrusters was retouched to make the black spacecraft body fade into the blackness of the dark earth background. The two lights were left mysteriously hanging in space. The fake was so transparent that a simple inquiry at the NASA photo archives in Houston would have uncovered the fraud. I was the first—and only—person to ask.

I talked with photo analyst Dick Underwood in building #8 at the Johnson Space Center (formerly the Manned Spacecraft Center). He has viewed every photograph ever brought back from space by astronauts. I asked him point-blank if he had ever found anything strange.

"There are a lot of things to photograph in space," Underwood pointed out. "We have photos of insulation fragments, gloves floating out of open hatches, fuel and urine droplets, boosters and rendezvous targets, flaws in the nega-

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tive, dust in the cabin between the lens and the window, and so on. Nothing has really stumped me for long."

"So there were no UFOs," I pressed.

"Unfortunately not," chuckled Underwood. "I'm kind of disappointed not to find something really interesting."

Other visitors to Underwood's office have apparently been far more skeptical than I. While researching a film (UFOs Past, Present, and Future) billed as a 'documentary', investigator Alan Sandler came to the same office (it is open to any member of the press, who may order copies of any photograph ever made by astronauts in space). He was looking for UFO evidence, or was looking for evidence that NASA was hiding UFO evidence.

One series of photographs turned out to be very useful. They were used in the movie and were reprinted in the book of the same name, authored by Richard Emenegger. They showed three lights in a row against a dark background; Sandler added that NASA "said" they were Agena tracking lights, with the clear implication that it was an obvious coverup of a true space mystery. Tracking lights, indeed, was the obvious implicit sneer!

"But that's exactly what they were," Underwood told me plaintively. We stood together over a lit viewing board in his laboratory, looking at the entire sequence from which Sandler had selected just two shots. The Agena was brilliantly lit by the sun, then the earth darkened beneath it, and finally it too faded into darkness. All that was finally visible was a row of tracking lights.

"I brought this whole sequence to Hollywood to show Sandler, but he wasn't interested in using all of it," Underwood explained. "Unfortunately, he just used what he had taken."

Every few years a new report comes out of Berkeley, California that Apollo-12 astronauts were followed on the way to and from the moon. The source is Dr. James Harder, research director of APRO. He seems to have found the secret information in an article in *Saga* magazine.

The quotations are indeed accurate. Astronauts Conrad, Gordon, and Bean were joking about flashing lights visible in space, lights which quite obviously came from tumbling fragments of their own booster rocket which was in a nearby trajectory. Conrad's own words on the matter (he has verified the quotation directly to me) are direct and to the point:

"They've been after me for years because we were followed by a UFO on the way to the moon. That, of course, was untrue. The guy who came up with it was going by our transcripts where we saw debris from our own rocket and were joking with the ground crew

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about it. He took this out of context. I called the ground and said, 'Hey, gang, we're being followed, there's some flashing object out there.' Some scandal sheet took that and made a helluva story out of it."

Harder's version is that Conrad, and his crewmen, are being forced to lie to the American people by some secret government agency that can control ex-astronauts but cannot intimidate college professors. There is a simpler explanation, and it is that Conrad is telling the truth. What that implies about Dr. Harder and APRO is something else.

Two of the most respected UFO researchers in the country are Dr. J. Allen Hynek and Dr. Jacques Vallee, leading officials of the Center for the UFO Studies in Evanston, Illinois. In their latest book, *The Edge of Reality* (Henry Regnery, Chicago, 1975), they reveal the quality of their scientific research by publishing a "Table of UFO Sightings by Astronauts." Aside from misspellings, wrong dates, and completely discredited reports, they demonstrate that they did not even read their own book carefully: Mercury-9 is launched a year before Mercury-8, Voskhod-2 is launched a year before Voskhod-1, Gemini-4 is launched a year before Gemini-3. The quality of their accuracy leaves much to be desired. (Hynek disavows any responsibility for this section of the book).

While UFO devotees claim that astronauts are ordered never to discuss UFO sightings, they proudly display quotations from astronauts indicating the possibility that UFOs may be real (astronauts have no special inside information, and are just as well-informed, or as *badly misinformed*, as the average citizen). Even the quotes can be questionable.

On November 27, 1973, chief astronaut John Young was asked about life in the universe, and he was quoted to the effect that "there are so many stars that it's mathematically improbable that there aren't other life sources in the universe." The AP wire story from Seattle started off with the sentence, "Astronaut John W. Young says that odds are that unidentified flying objects do exist." Before you could say "UFO flap," the punctuation in the sentence had been rearranged. Vallee gives the quote as follows: *"Odds are that UFOs exist"—Astronaut John Young.*

The pattern of "astronaut UFO sightings" in the news now becomes clear. The object seems to be to create enough smoke so that people will suspect that there is a fire *somewhere.* Probably the two most original and persistent rumormongers of this type are George Fawcett and Garry Henderson, whose stories are eagerly reprinted and embellished by writers like Hayden Hewes (of the "International UFO Bureau"), Ma-

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jor Donald Keyhoe, and Bob Abborino (of the *National Tattler,* "the most respected name in people-to-people journalism").

A revealing look into the mentality of such writers was afforded me by an exchange of letters with columnist Gregory Kanon of Halifax. His weekly newspaper feature, "The Unknown," mentioned the Gemini-11 case and closed dramatically with the words, "Not surprisingly, NASA no longer accepts the satellite explanation. The file on the case is now marked with one large, unmistakable word—UNIDENTIFIED."

When I objected to Kanon's interpretation and presented my own analysis, he evaded responsibility for the story, claiming that he was just reporting somebody else's conclusion. He clearly was also taking no responsibility for the truth or falsehood of the opinion, preferring instead to pass on another juicy rumor, suitably dramatized and embellished from his own imagination.

In one local newspaper, my letter to the editor was carried, explaining what really happened on Gemini-11 and what journalists like Kanon had made of it. But there were dozens of other papers with hundreds of thousands of readers for whom Kanon's opinion is the ultimate authority and last word.

It should be clear by now that the "astronaut UFO" phenomenon is a manufactured phenomenon, loosely based on actual events, but essentially created in the imaginations and fantasies of UFO writers and 'researchers'. Not a single case has the slightest merit! There is not a shred of evidence—either photographic, anecdotal, material, or otherwise—to demonstrate that any astronaut has ever seen any object which might suggest that the earth is being visited by other spacecraft.

What the evidence overwhelmingly does demonstrate is the lengths to which even the most respected UFO groups can and will go to prove their point of view. If there is good evidence elsewhere, why the concentration on misquoting astronauts, forging photographs, and insinuating coverups? Why the need to convince the public that UFOs must exist because "even our astronauts have seen them?"

Such proof of the existence of UFOs must be sought and found elsewhere, if it exists at all. The payoff for positive proof will be so high that the effort is worthwhile, and real scientific research into the "UFO phenomenon" by physicists, sociologists, psychologists, and other scientists is long overdue. The proof we do have on hand is related to the quality of UFO research already carried out. It is embarrassingly low, and must be a severe disappointment to any of us who expect to find true evidence of alien contact, contact which sooner or later will occur. ■

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The Man Who Knew How To Make History

One of the eternal themes of human curiosity is the yearning to know How It All Began.

Murray Yaco

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The summer day that I caught my uncle rummaging through my chest in the loft above the sacrarium, I left G'grok II forever. Red-handed and red-faced he was, not with honest embarrassment, but with laughter. His gold oracle's collar soaked with hypocritical sweat, he held a pilfered page toward me with one hand, and gasping with hilarity, he pawed the hot air with his jeweled sceptre in the other as he attempted to recover his breath.

Murder in my heart, I snatched a crushed page of manuscript from his obscene hand, and tried to smooth it out. His blunt, hairy fingers had made horrible impressions on one of the last pages of my thousand-volume final draft of *A Study Of Galactic History*. "Fraud! Liar!" I yelled. "You promised you would never—"

My uncle stopped gasping. He took a step backward, his head brushing a golden rafter. For a moment a green cobweb clung to his damp, bald head, then sprung back in revulsion to the darkness of its corner. "My dear boy," he began, his almost colorless lips puckering hesitantly for a moment in his great red face, "My curiosity simply *overcame* me. You've been sitting up here for more cycles than I care to count. Not that I mind supporting you, boy, but I *did* feel that I was entitled to one small snoop."

My uncle stared at me reflectively. "Fraud and liar, am I? And what are you? You call this . . . this trash, history? Great gods of the galaxy, boy! You're using direct quotations and actual dialogue! Is that what you've spent your apprenticeship on? It's such a vulgar idea, I found myself laughing. Phaugh!"

"But this is how history *should* be written," I rushed to explain, repressing my anger. "It is the first factual record of galactic history—event for event, through each cycle of birth, maturity and decay. And I include actual conversations from chronoscripts—not a bunch of stylized euphemisms that dance around the truth. It's a monument of achievement. I'll make history! It's—"

"It's unpublishable, it's in bad taste, it's factuality makes it obscene. Do you want me to go on?"

I ground my teeth, but managed to continue, "It's also the first time that recorded history tells the truth. And when I submit my project to the royal committee, they will award me full status. I know! I've had a prescient vision. The King himself—"

"You're dreaming," my uncle interrupted harshly. "You know the rules as well as I do. Your apprenticeship can't end until you receive ceremonial honors at the annual royal banquet. And you won't be invited until you fulfill the committee's terms. And as of right now, you're far behind schedule. Dangerously so," he added ominously.

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"The publishers on this planet are prejudiced—" I began to protest.

"Perhaps so. But you accepted the committee's terms. You agreed to present your work as a completely published project, accepted by a publisher on its own merits, presented to the royal committee, published and bound."

"Bound is the word, all right," I said angrily. "Hidebound. The straightlaced publishers here are blind to innovation. I've explored new areas no one has dared to touch."

"I've noticed that, too," my uncle said dryly, glancing toward the chest he had violated. "Your verbatim transcripts are sometimes very explicit. Don't you find anything sacred? Must everything be grist for your filthy mill?"

"History is made by intelligent hominids, by their motivations. Not by theories," I explained with forced patience. "And hominids are animals. We are intelligent, yes, but animals all the same. Sexual motivation is—"

"Perhaps you should have apprenticed in zoology," my uncle interrupted maliciously.

"I am a scientist—I have the right to explore these things. My work is completely factual and objective. The incidents you refer to are comparatively few. To me, they are all in a days work. Somehow, you managed to see prurience everywhere!"

"Perhaps so," said my uncle, looking thoughtful, "but I couldn't help notice that your so-called objectivity seems peculiarly weighted." He cast another glance toward my chest, and then confirmed my growing suspicion that this had not been his first, small snoop. "Even when you write about the history of technology, it somehow sounds faintly lascivious. But possibly you're not even aware of your stylistic tendencies. Eh?" He leered at me mockingly, then leaned forward and peered at me closely. "I hope your work won't tempt you to forget your vow of chastity."

"How could I?" I said, surprised at the tone of my voice and its load of bitterness.

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My uncle peered at me again, examining the thumbnail-size, orgone-sensing mole that had been implanted near the center of my forehead, the day I took my vows on G'grok II, known throughout the galaxy for its planet-wide Cult of Pure Scholars.

His eyes full of unmistakable warning, he said, "You had better think twice before humiliating me or my sister—your mother—by any rash act. I sponsored you out of family loyalty—and because I thought, at one time, that you might have some brains. Just remember: One rash act, and you will not be able to hide it. Your implant will fade and fall off within days. You will become a pariah. A man who violates the Cult's vows on this Pure planet, finds the reality behind the ancient T'thongs' silly legends about hellfire."

"How could you believe I would do such a thing!" I protested with passion. "Why, I'm on the verge of achieving my life's goal! I'll make history! I told you I had a prescient vision. I've seen myself sitting next to the King at the honors banquet."

"There might be a bit of the oracle in you, at that," my uncle conceded. "After all, you're my own flesh and blood. You get your crazy ideas from your father's side. But the honor banquet? Why, you can't even find a publisher for your work. You're a long way from meeting and eating with the King. Among themselves, the publishers and editors on this planet call you 'the High Oracle's crank nephew'."

Fuming, I slammed shut the lid of my chest. The old fraud seemed strangely fascinated by some of the chronoscript records I had selected to fill out the lives of important historical figures. I wondered if he could somehow have found a way to replace his own orgone-sensing, tattletale mole with a fake.

My uncle's voice became severe. "From now on, you keep your nose to the grindstone and out of the future." He glanced at my storage chest. "In return, I'll keep mine out of the past."

He picked up his sceptre and pointed its crown with its jeweled snake eyes at my head. "Your time is running out. Actual, word-for-word conversations as history, indeed! Preposterous! If it wasn't for your mother, I'd terminate your apprenticeship right now. As your sponsor, I have the authority." He lowered the sceptre. "But for the sake of the family honor, you will have one final chance. Publish or perish, as the saying goes in our Cult. I want you off the planet by nightfall. Find some place, any place, where they'll have the bad taste to publish your work. And remember the terms—accepted and published on its own merits. I'll give you two cycles, no more. And I'll make sure when you leave that you take only round-trip fuel, a minimum number of personal pos-

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sessions, and a translating apparatus. No flesh and blood of mine will scrape through his apprenticeship with a vanity edition."

Stunned, I watched as he ceremoniously turned his back on me, switched to his melodramatic, fraudulent oracular voice and said, "I prophesy that you will find making history very hard work."

Crank was I? I'd show them crank! Some day I'd win more than royal honors—I'd make history—and punish them all in the bargain! I incinerated the million pages of manuscript that constituted the work of my apprenticeship, packed the tiny spools of precious master tapes I had printed them from, and accelerated away from G'grok II. I traveled light, taking only an assortment of miscellaneous clothing, a quantity of various types of barter coins and a variglyph—a portable printing apparatus that would reproduce manuscript in any typography, its translating and editing functions managed by remote linkage to my ship's computer.

I set a course for a planet listed in a guide as semi-barbaric and semi-literate, but at the fourth level of development, which meant reasonably familiar cultural structures. I was quite certain that compared to the swill that passed for serious prose on this backward world, my *A Study Of Galactic History* would shine like the jewels in my uncle's treacherous sceptre. There, my achievement would be recognized. It would only be a matter of time before the entire thousand-volume work would appear in print. I would return home, well before my deadline had expired, and be awarded full status in the presence of the King himself. I would also be awarded a large estate befitting my status, and a staff of servants and my own apprentices. I could look forward to a rich life, graced by leisurely scholarship, continued achievement and purity.

I orbited the planet slowly—allowing the ship's omnivorous memory cells to absorb the language transmissions they would require later. I landed in a rural area not far from a primitive city. As an historian, I was fascinated by the crude architecture and early technology. Confident that my vehicle would not be discovered where I had spiraled it below the bed of a fast-flowing nearby river, I rented an uncomfortable, but adequate, small hotel room in the city. I spent several months learning to speak the local language, and using my variglyph to produce the first English version of an early volume of my work.

Production of the manuscript proved to be a slow, difficult process. The small machine's energy source for maintaining the link that gave me access to my hidden ship's computer was self-contained, and would last indefinitely; but it also

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required an external power source to pump the rather hard vacuum required by its printing cylinder, which magnetically embossed and de-embossed as it rotated and expelled manuscript. The machine's drive mechanism was not compatible with the multiple-phase alternating current favored by this preatomic civilization. This could prove extremely troublesome, I realized. On a fourth level world I had every right to expect that the available electrical energy would meet my needs.

I was forced to fabricate a crude handle, and power the apparatus with my own strength. It was arduous work, for the machine required great torque to operate. When forced to rest my aching arm, I paid visits to a local library to gain knowledge of the planet's literature and its publishing conventions. I also visited bartering shops to trade coins from my precious collection of historically significant erotic money. To my dismay, I only received ridiculously small amounts of the local currency in exchange.

Finally, I was ready to travel to the city that contained an important publishing complex. I boarded a train—a fascinating vehicle powered by fossil fuel. At times, when we rounded long, graded curves that looped among startlingly beautiful mountains, I could actually see the strange 'engine' that pulled us. The sight was especially awesome at dusk. The serpentine beast roared ahead, snorting black smoke and flames. Like some fairy-tale creature from intergalactic space, it flashed its huge, single bug-eye—and shrieking horribly, charged the darkness ahead.

During most of the journey I sat next to a hawker—a salesman for a book called *Holy Bible*. He insisted that I examine it. I found, to my astonishment, that I recognized it immediately. The heavens only knew how it originally had come to this planet to be plagiarized. It was a somewhat garbled, but essentially accurate version of a comedy of manners that had been a favorite among the ancient T'thongs—once the most despised race in the galaxy, until they depopulated themselves by inventing a birth control compound with late-appearing side effects that converted sexual impulse into a desire to hum.

After depositing part of my luggage in a safekeeping locker, I walked from Grand Central Station to the offices of Hasgood House, a publishing firm that was, I had learned, well-known for its sympathetic reception to unknown writers. Arms aching from the weight of my heavy, shabby luggage, I limped through dim, marbled corridors, searching for the office of Basil Hasgood, the renowned editor and publisher. I stopped in front of a door and stared at honey-colored letters on

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frosted glass: *Basil Hasgood, Publisher and Editor.*

I clutched the two peeling handles of my suitcases that were filled with manuscript I had reproduced from my tapes. I pulled back my shoulders and vainly attempted to see my reflection in the door's window. But I already knew how I must appear after the exhausting journey on the steam-driven train: the small, pale face with its oval, tattletale mole near the center of its forehead; the creases of travel fatigue around eyes and mouth, imbedded with soot.

The door with the frosted glass opened before I could knock. "What's in the bags?" asked a kindly giant.

I nodded toward the suitcases and said. "This is a book. One volume of a projected work. I have traveled a long way, and would not take up your time, I assure you, if it were not quite out of the ordinary."

Basil Hasgood looked at me thoughtfully. He was a heavy man, made heavier still by the thick suit of animal wool that he wore. He stood before me, his huge, square chin cupped in a massive hand, each tweedy inch the editor-mentor-publisher.

"When were you born? What month?" he asked quietly.

"Why, uh, in September." I answered, quickly having calculated the equivalent date of my birth on this planet, but feeling a blush of confusion beneath the patina of railway soot on my face.

"What day? At what time?"

"The seventh," I said, puzzled. "At midnight."

"Fantastic! A Virgo! Come in, come in! You are destined to make history!"

"Thank you," I said, stumbling after him.

"Thank the stars, young man. I pride myself on my ability to detect talent quickly. Why, with today's fortunate conjunction, nothing could be better! Some day you will rank with the immortals of literature!"

Dazed, I followed him across a maroon carpet and set my suitcases down in front of the leonine legs of a huge black desk.

Basil Hasgood glanced at a large, complicated chart on the wall behind his desk. "There's no question about your destiny," he said with astrological conviction. "We will begin working together on your book, now." He motioned toward my suitcases. "One thing—I want your assurance that this is your own work. True, you are destined to make history, but I would hate to think that I sponsored you, only to find that you were carried to glory on another's shoulders."

"I can assure you that it is all my own work," I said, bending down, fumbling excitedly with the suitcase latches. "I am the original creator." I was able to throw the lids open simultaneously with a

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flourish. And there for all the world to see, piled neatly in row after row, fifty to each suitcase, lay one hundred Holy Bibles.

Basil Hasgood looked into the open suitcases and then at me. Seldom has such fury been reflected on a humanoid face. "The creator, are you?" he shouted, taking a step toward me. "I should have known what you were! A Capricorn, most likely, and marked with a mole at that. Well, you'll be marked from now on! I'll circulate your description to everyone in publishing who might be tempted to let you through a door!"

I began to back from the room.

"You crank!" he exploded, as I ran for the door, abandoning my suitcases and more copies of the extinct T'thongs' favorite comedy of manners than I could ever have dreamed were left in the universe. "You dirty, hayseed, mole-marked crank!"

Looking back after so many years, I am even able to sympathize with the Bible salesman who carelessly exchanged bags with me on the train. Punishment enough it was that he, a peddler of the word of God, should have opened his suitcases that same day, only to have found six thousand pages of Volume 14 of my study of history. In scholarly English it was entitled, *The Coming Crisis: Climax and Failure In Premature Intergalactic Intercourse.* It was a factual, blow-for-blow account of a critical historical interregnum—hardly racy reading for an obsessive.

But as for Basil Hasgood, who had not even given me time to explain the unfortunate mixup, I could not conceive of an adequate punishment. Crank was I! I'd show them crank! And I'd punish them all in the bargain!

Despite my unfortunate reception in this city, I still believed in my vision. I knew that, in time, every word of my thousand-volume history would be published on this planet. But it would be slow work turning out the English translation by hand. It would be a tight race against time. The niggardly two cycles my uncle had allowed were barely twenty years on this frantically revolving world. I dared not exceed the time limit for another reason: a bit longer, and the energy cells on my hidden ship would oxidize. I resolved to work to a rigid schedule, increasing my output each day as the strength in my arm increased. When destiny found me a publisher, I would not lack for manuscript.

I rented a large, but inexpensive, loft that spanned a row of tawdry shops and small restaurants. Inside, their pale, failing owners faced out the unwashed front windows, like petrified sentinels trapped dreaming in cages of glass.

My new quarters were shabby and cheerless. The last tenant, an unhappy artist, had finally opened

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the loft's only window, and squeezed out his life on the palette of concrete five stories below.

A ladder-backed chair without any slats stood in a corner, next to a crippled easel. The leg had been splinted with several caked paintbrushes and torn strips of rag. On the easel, an unfinished canvas lent a bit of color to the drab walls and floors. An ugly young woman—naked, mournful, chilly and thin—sat in the room's slatless chair, her hand lying limp in the bowl of cold, shriveled fruit in her lap.

I ordered half a carload of paper, and set to work. Nothing distracted me—not even the noise of the primitive elevated train outside the walls of my loft. Rafters trembled at the train's every passage, but each roaring transit seemed to renew the strength in my aching arm. I worked feverishly, month after month, never doubting my vision. I was also inspired by the knowledge—that seemed to come from outside of myself—that destiny would use me as its instrument for the destruction of Basil Hasgood and all others of his hypocritical, fraudulent ilk!

I took my meals at a nearby cafe that offered a free lunch with the purchase of beverages. The food was abominable, but I had little choice. I seemed to be constantly hungry—a result of the unaccustomed physical labor demanded by my work. My small hoard of coins had to be carefully husbanded. The city's pawnbrokers accepted my ancient gold coins with alacrity, so fascinated by their weight and color, they did not even glance at the historically priceless erotic scenes depicted by ancient engravers. But they actually became angry when I attempted to barter coins from the balance of my collection—engraved with similarly fascinating scenes, but engraved on small wooden disks.

In the cafe, I was barely sustained by the meager portions of fetid creamed herring and other horribly prepared Scandinavian appetizers doled out to each customer by the servants, a handful of scandalously costumed young

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women. It was here that I eventually made the acquaintance of several writers who lived in the neighborhood. All of them were moderately successful. They barely tolerated me. Caught in the perversion of being unable to create without constant editorial collaboration and assurances, they considered my solitary work habits eccentric.

"When you going to come out of solitary and get yourself an editor who'll sit down, hold your hand and edit your manuscript?" I was asked one evening by a writer named O'Halloran, an overly-hearty man whose long, red sideburns almost embraced the knot of his tie.

"Never. I'm quite certain that I will find another way to publish my work when the time comes," I said.

"Oh, come off it!" O'Halloran said. "Even if your work has merit, no one will read it unless you get their attention. The mail is a waste of time. You need a sponsor."

"When the time comes, I'll find a way to get the proper attention." I said, suppressing the rage I felt at his allusion to editors.

O'Halloran sighed. "Look. I don't know why I should bother, but I'll try to explain. The *point* is to publish. And for that you need to get an editor's attention. You've got to get him involved—interested enough to read your book page-for-page, word-for-word. And the better-known the editor, the better the reviews."

O'Halloran looked at the pile of change in front of my coffee, and then at me. I nodded, and he motioned to a daringly clad, yet rather intelligent looking young woman who seemed to be staring at me with interest. "The facts of life are unpleasant and simple," he continued. "In Gotham, today, there are as many famous editors as famous writers, more I suspect. I only wish my editor was better known. Anyway, reviewers are suckers for celebrities. So, if an unknown writer is the protégé of a well-known editor, then naturally the reviewers are more sympathetic. In fact, if the editor is enough of a celebrity—say, someone like Basil Hasgood—the new writer's reputation can be made overnight. The main thing is getting launched right. Inertia takes care of the rest."

I lifted my coffee to hide my face and its flush of fury.

"I wish I could get started on something new," O'Halloran said, quickly losing interest in me and addressing his remarks to the mug of beer in his fat, red hand. His latest book, *A Lexicon For Irish Theosophists*, was enjoying a fadish success.

"How about a book on portents," suggested Connoly, an extremely nearsighted, supercilious man who taught Greek and wrote introductions for translations of classics. "Since the Crash, there's practically

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an unlimited demand for that kind of superstitious tome. No offense, of course." He grinned, then quickly placed his heavy lorgnette next to the small plate of free herring and meatballs beside his stein of beer. I glanced at his plate covetously; my own plate was already empty.

"I'm surprised that the public continues to read books like those." I said. Everyone looked at me; I rarely participated in their conversation.

"The public? It's not really the public," a high, bitter voice remarked. It was Cuthbertson, the dwarfish, pock-marked society poet whom the reviewers had been treating unkindly since the Crash. "Who can blame the public? They read the swill that's forced on them." He nodded malevolently at O'Halloran. "Theosophy, phrenology, astrology, psychometry!" He extended a sequence of tiny fingers from an angry fist as he shrilled them off. "And you know why? It's the publishers' readers and editors! They're the ones. You can't find a more superstitious bunch than the post-Crash, dilettante, Blavatskyist, commercial literati. Phaugh!"

"He's right," O'Halloran said with obvious good humor. "They're all of a breed." He lifted the forefinger of one hand to keep everyone's attention, while with the other he raised his beer and drank deeply. With the back of his hand he reached up and wiped away a nest of foam that had attached itself to one of his sideburns. "Do you know that Bennington, my editor, keeps a list of all the misspelled words he runs across in his manuscript reading? Says that he dreamed they're going to form a message."

"How's he doing?" Connoly asked from behind the ice-cube-thick lenses of his lorgnette.

O'Halloran grinned and said, "The other day he asked me to help him make heads or tails of it. I looked at the list, and about all I could suggest was that if there were a message, it was to tell his writers that it's 'i' after 'e', except before 'c'."

"Are they all like that?" I asked excitedly.

Cuthbertson looked at me speculatively for a moment, then shrugged and squealed out, "To the man—a bunch of superstitious, post-Crash, dilettante, Blavatskyist fools!"

"Hey," O'Halloran said, motioning toward me with his beer. "When you going to be through with the magnum opus?"

"Soon, very soon," I said, my voice almost trembling with the excitement I felt; for I knew, with prescient certainty, that the way had been revealed to me.

"Really cranking it out, eh?" O'Halloran asked.

"What did you say?" I demanded.

"He said 'cranking it out'," Con-

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noly said. "What's wrong, man? You look positively dazed. Are you ill?"

"You'll have to excuse me," I said. I reached for the check, which I almost never had to pay, since O'Halloran stubbornly continued to believe that someday he would beat me at arm wrestling. "Sorry to leave early," I said, getting out of my chair. "I'm not quite myself tonight."

Cranking it out, was I? *Now* I would show them *cranking it out.*

Certain that destiny's plan had been revealed to me, I purchased an inexpensive reference that listed the addresses of publishers and the names of their 972 editors and readers. I then selected a tape I had not yet translated, Volume 20 of my *History*. It was a straightforward account of how, through technological innovation, a race of ingenious hominids had created cyclic economic chaos during the XXX Imperium. I had included historically relevant descriptions of the first methods they used to control the phosphorylation of pseudoprotein during the manufacture of deoxyribonucleic acid for commercial sophont production. I also examined some of their early, critical insights into the behavior of pomerons—insights which led to the harnessing of multi-dimensional gravitational interactions.

I loaded my apparatus with paper, adjusted the controls that linked the variglyph to my ship—deciding it would be best to set the editing controls to produce manuscript in English at a level of comprehension suitable for near-cretins—and began turning the crank.

Muscles hardened by previous endeavor, it took less than a month to turn out the one master copy I needed. I sent it off to an inexpensive duplicating firm, and obtained the required number of reproduced copies. I realized again that, someday, somehow, I would have to increase my productivity, and do it in a way that would not involve the hired muscles of some curious stranger. I had already spent a great deal of time on this planet, and had only managed to translate less than ten percent of my work. At this rate I would be a stranded old man, my ship's drive turned to oxide, before I reproduced my entire thousand-volume *Study Of History* in English—much less saw it in print.

I excitedly began packaging and shipping Volume 20, entitled by the variglyph, *Revenge Of The Time Monsters*. In simplistic English it was an account of how the blind Gwirsh Dwarves, with their evil scientific genius, created a slave race of parsec-sized, intelligent photonic creatures (whose heads contained the grafted, red eyes of immense, silicone insects) that escaped and almost overran the galaxy. They were finally imprisoned

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by the Imperial Space Patrol on ubiquitous dead stars where they dwell even today—their shifting red eyes producing the illusion that their star-prisons are receding at preposterous velocities.

I mailed the duplicated manuscripts to the names on my list, along with a registered covering letter; I would soon find out just how superstitious these primitive hominids were. The letter read: *Unless you read every word of* Revenge Of The Time Monsters, *you and your loved ones will live under a terrible curse. This is a portion of a thousand-volume work which is available for publication.* Read every word. *Then, completely fill out the questionnaire conveniently inserted after page 7,124 of the manuscript. You may keep the MS, but return the questionnaire in the handy, addressed, postage-paid envelope.*

Within two months, I had received back almost all of the questionnaires, which I had included in order to obtain the kind of page-for-page, word-for-word attention that O'Halloran had advised was so necessary.

I received considerable satisfaction in obtaining detailed responses—usually written in a trembling hand—to such questions as:

Question #148:
You will remember that Princess L'Himun has been trapped in a castle on the smoldering volcano planet, Fallus. Clad in a torn, flimsy nightgown which she was forced to put on while the turncoat, Sir Grath, watched and leered, she listens to the drunken merrymaking of the Gwirsh Dwarves in a nearby room. Sir Grath tells her that unless she reveals the formula for her father's revolutionary new discovery—a chemical compound which can create new races, but when used by humans, stirs all women to lascivious frenzy—he will let the Gwirsh Dwarves "use you in their own carnal, pleasure-seeking ways." To Sir Grath's surprise, Princess L'Himun laughs at this threat. This is because (Check only one):

☐ She is not afraid because the Gwirsh Dwarves are an illusion which she has produced to distract Sir Grath, whose penchant for Gwirsh Dwarves had already made him the laughingstock of the Pleiades.

☐ She is not afraid because she, herself, is a Z'Mobutu—a royal cult creature, trained since crèche days for the sole purpose of providing carnal pleasure for illusory Gwirsh Dwarves.

☐ She is not afraid because her personal robot, Gondolphus, disobeying several of its prime directives, and evading the time monsters, has created a gigantic planet-wide

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thinking machine on a world whose surface was destroyed by bombs that employed the energy released by atoms, and whose surviving mutant inhabitants now live on island cities that travel through time and space.

But to my great disappointment, not one of the returned questionnaires included an offer to publish the manuscript—much less the entire thousand-volume work I had *referred to in my letter.* Why? Even the treacherous Basil Hasgood had somehow known I was destined for greatness. Was my perfidious uncle right, after all? Was I a dreaming fool, and a hack in the bargain?

I walked to the wall that contained the loft's only window. I looked up at the blue, frigid sky—then peered down below, where underneath the city's endless, cold sidewalks the fossilized memories of black, million-year jungles blazed in uncountable furnaces, then turned to dead ash as they gave up their ghosts to haunt the city above. In the motionless winter air, pillars of sandstone-brown smoke were mounted on ten thousand roofs, as though bracing the sky.

Hearing a noise, I turned around. The mailman had slipped something under my door. Slowly, hopefully, I opened the envelope. My mood of dark speculation ended once and for all. The envelope was from a former editor who had been on my list—a man who obviously knew superstition for the drivel that it was—and knew a 'round-about way that would lead to my ultimate triumph!

Late in the afternoon, a few days later, O'Halloran knocked on my door. With uncharacteristic friendliness he had walked out of his way to invite me to join him for a drink. "In a moment," I said, carefully straightening a tilting tower of manuscript in a corner of the room. "I'll put on a coat."

I returned from my closet to find O'Halloran with a handful of manuscript. "Mary, Holy Mother of Jesus!" he gasped, turning to me. "This is your stuff? You wrote this?" His awe was so genuine, my anger quickly faded. I nodded.

Reaching up he replaced the pages on the top of the pile, then turned to me, obviously shaken. "My God, man! There's enough piled there for fifty books."

"Yes, at least," I agreed, motioning vaguely with my heavily muscled arm, past a partitioning curtain, to the invisible towers of manuscript stored in the balance of the huge loft. "I'm going through a very productive period."

"Jesus!" O'Halloran exclaimed. "All this, and in so short a time! It must be some kind of a record. You're making history up here all by yourself!"

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"Well, yes," I said thoughtfully, getting into my coat. "I suppose I am, in a manner of speaking."

O'Halloran still appeared dazed as we walked down the steps and into the street. "I have to admit I'm impressed," he confessed. "And from the little I read, I'd say . . ." He paused, searching for words.

"Yes?" I encouraged.

"Well, my friend, I'd say that if there's ever a vogue for interplanetary Gothic smut, you've got the market cornered."

I ignored his remark, realizing that like most Irish bachelors, O'Halloran found prurience in every shadow. But I was pleased that he was impressed, since like writers everywhere, I responded to approval—even when awarded for the wrong reasons.

"How is your new book coming?" I asked with forced courtesy, then closed my ears as we began to walk.

For some time now, I had found myself unaccountably excited and happy during the long walk to our cafe, preferring it to the underground train. Today, late afternoon crowds filled the sidewalk, growing in density as the city's tall buildings expelled torrents of noisy, homeward-bound men and women. It was beginning to snow. I felt a great sense of well-being as we pressed through the crowds, brushing shoulders of every description. I was surrounded by smells of damp clothing spun from animal wool; aroused by the textures of silky fur collars that sometimes briefly swept my cheek; made happily dizzy by the aromas of spicy tobacco, of a hundred perfumes.

I noticed that the hurrying crowd on the sidewalk had suddenly split into two streams, to avoid a man and his stalled pushcart of apples. Somehow, half his crop had tumbled from the lame cart's waxed pyramid of fruit. The cart's master stood rigid and blinked at the sky, as though having suddenly awakened in a strange, vertical bed. I hurried on past, and drew a deep breath to pinch my nostrils against the cidery smell of the red windfalls squeezed out on the sidewalk below.

We walked into our cafe, sat down at our table, and nodded to Connoly and Cuthbertson. "But as for your problem—," O'Halloran began. He broke off as Ursula, our waitress, came toward the table with our tray of beverages and smorgasbord. She loaded my plate first, her hips pressing against my body as she bent over to serve, unnecessarily far, I thought, and ladled out an unusually large portion of the evil smelling assortment. The young woman had seemed to favor me of late. And why not? I suddenly realized that except for my disfiguring mole, I was quite a handsome young man, even by the standards of these quite handsome hominids.

She finished serving, and the

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three of them watched her walk away, her body undulating from side to side, especially the portion immediately below the hem of her brief, red dress.

"But as for your problem," O'Halloran picked up, "you've missed your chance to follow my advice to find yourself an editorial patron. Strange things are happening. Aspirant authors will be leaving the city in droves. The Bible Belt will be repopulated within weeks," O'Halloran grinned.

"What on earth are you talking about?" I asked.

"Wait till I swallow some of this," he said. "When I bring bad news, I like to chase it with cold beer."

"It's as though the editorial offices are staffed by ghosts," O'Halloran continued. "They *buy* everything brought to them by their regular authors. And I suppose I can't complain in that respect—"

"Oh, you've sensed it, too?" Connoly interrupted cautiously.

O'Halloran dragged a damp napkin across the foam on his chin. "Look," he tried to explain, "I know I'm a superstitious Irishman, but I swear to God nobody is *reading* anything. They're just buying!"

"You're right!" shrilled Cuthbertson, the dwarf poet. "I've heard things, too. It's as though they've all been conditioned by some extraordinarily horrible experience. It's as though," he continued thoughtfully, the tips of his hairy fingers strumming the thin, tired tablecloth, leaving tiny damp hollows wherever they wandered, "as though every reader and editor simultaneously opened a manuscript, only to find a snake inside. And from that moment on, no one is willing to take a chance on it not happening again. They've got some kind of manuscript phobia."

Connoly, the half-blind anthologist and teacher of Greek, tended to agree. "I know what you mean, believe me. It isn't farfetched. Let me tell you something." He hesitated, afraid of making a fool of himself, then, clutching the handle of his beer stein as though for support, he leaned forward confidentially. "I hear things that frighten me. Unbelievable things. I'm not *really* a writer, I'm a translator and anthologist, so that's why I'm privy to inside information."

"What you're trying to say," said Cuthbertson, not attempting to hide his disdain, "is that you're more of a businessman than a writer, and you get your classical nose into the business offices of the better publishing houses once in a while."

"Listen to this," Connoly said, ignoring the interruption. "I hear that no one—whatever the reason—will unwrap a manuscript, much less read one. In desperation, they now have a policy of publishing everything their regular authors submit, sight unseen, I gather. New writers' material is selected according to a pattern. At one place I

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know of, they pick every forty-fourth unsolicited manuscript; at other houses it's every one-hundredth, one-hundred-and-eighth, or whatever, depending on the number of titles they're geared to produce and sell. The typesetters and proofreaders must do the rest."

"Damn!" Cuthbertson exploded. "I was going to try a new publisher."

"Who?" Connoly asked.

"That new place. Random House."

"No wonder the better writers have all suddenly taken to drink," O'Halloran said, shamelessly hefting his beer. "I damn well miss the hand-holding I used to receive. Now they simply say 'thank you'! The age of the editor-mentor is over. It's like being abruptly orphaned."

I held a trembling cup of coffee in front of my face, barely covering my naked joy as the three of them continued to speculate disconsolately.

O'Halloran broke off talking and swiveled to face me. "What will you do, head for home?"

"No, not for quite some time," I said. "Actually, I've made a small beginning here, and I'm quite pleased with my prospects." I paused as Cuthbertson and Connoly abruptly quieted and gave me their attention. "Oh? An encouraging opinion from a friend?" Connoly asked.

"Considerably better," I confessed. "I've sold a few things, and even have future commitments, including a hardcover serialization. Beyond that, I have the feeling that my future will take care of itself."

"But who bought them? Where will they be published?" the dwarf, Cuthbertson, shrilly demanded.

I mentioned the names of the publications that my newly acquired literary agent had successfully approached.

"Of course!" he exclaimed, his shock and jealously instantly changed to disdain. "The pulps! The new penny dreadfuls. Phaugh! Horse opera and space opera triumphant! And from what O'Halloran told me a minute ago, you've got enough of the latter to paper the earth. You and your kind will probably inherit it. Phaugh!"

Connoly held up his lorgnette and stared down at me along the length of his fine, long nose, appearing amused. "The pulps, eh? Well, why not? Literature dead—murdered by something or someone with one fell stroke. And you in on the ground floor, in the ashes, with an idea that's found its time."

He waved the thick cubes of his lorgnette aside, smiled icily and continued, eyes and voice frosty with ridicule. "You'll make history, eh?" He hoisted his beer mug. "A toast! To the bard of the spaces between the stars!"

"Yes, yes," said Cuthbertson, the smile in his oversized head radi-

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ating horribly. "The new Horatio Alger. A humble beginning, but with persistence he overcomes every obstacle. Your mountain of manuscript gives you a headstart. In time, you'll be hailed a pioneer—the Grand Old Man of the new genre. The tenth muse, Trash, will rule the day—"

"And you'll be on top of the heap," said Connoly, delightedly picking up the cudgel as the two of them unknowingly began to beat my final plan into shape.

"Always obey your commercial instincts." Cuthbertson admonished, his sneer almost level with the top of the table. "Get there 'fustus with the mostus'—the others will be hard pressed to keep pace."

"By all means! Sell it by the pound if you have to," said Connoly, laughing and jumping into the game with both legs. "Use a hundred pen names. Deluge them. Your pulp-headed editors will think the flood of submissions means an expanding market. They'll start new ventures to accommodate you."

"Someday, librarians will go blind, cross-indexing your titles and identities!" Cuthbertson shouted in a tattoo of squeaks, using tiny hairy fists to drum punishing mirth on the unmovable table.

"Your nonsensical plots will be seen as profound, picaresque explorations into the condition of man," said Connoly, tearful with glee.

"In time, your terrible clichés will be the only respectable literary currency," predicted the other with mock solemnity, "debased coin chasing precious stuff out of circulation. You'll be plagiarized, your ideas imitated and distorted beyond recognition."

"Your parodies of science, deemed visions of the future; your dreams of stellar conflicts, applauded as high culture," chanted the dwarf poet.

"If you ever decide to chase women—which I doubt—you'll have your pick," Connoly mocked. "They'll find your fame an irresistible aphrodisiac. Even in your dotage, they'll chase you for your favors."

"Your works will be mandatory reading at great universities!" said Cuthbertson, as the two of them rocked alarmingly back and forth on their warped little seesaw of scorn, pumping out prophecy and spleen.

"Enough, now!" said O'Halloran, gaveling the table with his empty mug, looking flustered and embarrassed. "Let's get back to something serious, like ordering more beer."

My companions once again began chattering vacuously among themselves. I sat back in my chair to enjoy my small cup of coffee, simultaneously feeling a happy sense of completion and great excitement about the plan that these crude, chattering instruments of destiny had unfolded for me. It would still

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be a race against time, but with an ever-increasing income from my work, I could afford to stoke my hunger and increase my productivity to keep pace with the growing demand.

I turned in my chair, picked up a corner of the heavy drape that masked the cafe's sidewalk window, and peered out at the city. I craned my neck and looked up at the tall, splendid buildings. The night's first darkness climbed down slowly from a thousand towers, chased by a confetti of yellow light, as a million invisible hands snapped on silent switches.

Abruptly, my feeling of well-being changed to one of nostalgia, a nostalgia that was certainly premature. My leave-taking was still a long way off. But I knew I would miss the excitement of living here—would someday miss the stimulation of this unusual city and its extraordinary people. They were querulous, volatile, unpredictable; but at the same time, warm, spontaneous and amazingly imaginative—with a poverty of inhibition that was like a breath of fresh air. I suddenly realized I was actually flirting with the notion of spending my life on this world. It was a silly fantasy. I had directed myself too long toward one goal. True, my work would win a certain kind of approval here—even though my great effort to reveal the truth about the past would not be recognized for the triumph it was. And true, I would receive even more approval when my various reputations were established, and I then began resetting the variglyph to produce manuscript in increasingly more sophisticated English. I would begin to draw in an even wider and more satisfying audience. As time passed, they would look back in wonder at my tales of the 'future'—tales that would often contain developments resembling those in their evolving present. In the meantime, let them enjoy my History as bunk. I would thrive on their approval, even if given for the wrong reasons. But I could not imagine any substitute for the fulfillment of my vision. I was conditioned to demand that my success be confirmed with the symbols that represented everything I had striven for: the invitation from the committee, the great banquet, the high honor conferred in the presence of the King.

My reflections ended without warning, as my eyes blurred and I found myself in the middle of a vision. It was much more detailed than any I had had before. Fascinated, I watched as though from a great distance and saw myself, much older, feasting among a glittering array of guests, seated next to the King. He was a jocular man who elbowed me encouragingly whenever the waiters offered food from giant silver platters. I could almost see and smell the food, which undoubtedly included the

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galaxy's rarest cuisine: there would be wines and plump fruit from the garden planet T'trantor; even roast haunches of the rare, wily H'hobbit. Suddenly, time telescoped and so did my view. I saw myself rising from my seat to accept the great honor, and I could actually experience the feelings that he/I felt at this long-awaited moment. I felt great and unmistakable joy . . . and yet, somehow I felt strangely distressed—certainly a peculiar overtone on such a triumphant occasion. Puzzled, I switched my onlooker's gaze back and forth across the great gathering. Then I looked down at the banquet table. My eyes widened with wild astonishment.

"More meatballs?"

I swung around in my chair, my trance shattered, and found Ursula about to heap my plate. "No thank you!" I said firmly, vowing with post-vision conviction that it would be a very long time before another Swedish meatball passed my lips.

"You look dazed," said Ursula, sounding concerned. She was an observant and intelligent young woman—a part-time university student who professed an interest in history. Lately, she had been especially pleasant and attentive, ever since I had somehow inadvertently left her a tip of several wooden coins from my collection—coins that depicted scenes of ritual springtime acrobatics by some imaginative, double-jointed hominids who lived at the edge of this universe.

"Dazed . . . is certainly the word," I agreed, looking around the table and somehow noticing through my lingering astonishment that my companions had already departed.

"When will you show me the rest of your coin collection? Would tonight be all right? You promised, remember?" the girl suddenly stepped close to my side, rubbing one of her bare thighs inadvertently against my own.

"Why . . . yes, I remember," I said, vaguely recalling an impulsive promise, probably prompted by her power to relieve my hunger.

"You look so serious," said Ursula, pressing even closer. "Is something wrong?"

"No, not really," I replied, and then touched by her concern, added, "I was just trying to . . . to second-guess fate, as an uncle of mine would put it."

Ursula giggled and suddenly bent down and playfully pressed her lips to my ear, as though confiding a great secret. "If you're considering a fate worse than death—as my mother used to put it—I'll be glad to help."

I stood up so abruptly that her lips brushed down the side of my cheek and neck. The girl's hand, which had been on my shoulder, had some how traveled to my waist, and seemed poised. I wondered what she was trying to get at.

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"We could walk to your place. It's cold outside, but the moon is out."

I seemed to be pinned against the table by the tray that she gripped with one determined hand.

"Walking all that way at night?" I temporized. "I've never done it before—"

"There's a first time for everything," Ursula said in a peculiarly penetrating voice.

"Yes. Perhaps so," I said slowly, thoughtfully, my still wide eyes focusing on the tray in her hand.

"Well?" the girl prodded. I hesitated, the sight of the food bringing back more details of my vision. I recalled watching myself as I rose to give my acceptance speech, voice quavering—not so much with age—but the result of the condition of my stomach, as over-seasoned ball bearings—prepared by some cretin who had more skill in tempering Stockholm's steel than in preparing meatballs—collided in deteriorating gastric orbits, frantically seeking to avoid a fate in the ooze of creamed herring below.

"If you can't make up your mind," said Ursula with the beginning of sarcasm, "maybe you should slip a coin. Go ahead. Use one of those funny wooden nickels of yours."

I still hesitated. The trip to Stockholm was a long time away, although the years of waiting would certainly be happy beyond anything I could ever hope for on G'grok II. There was only one thing that had to be asked: could I really trust the promises of the vision? But why this faltering of faith? The blood of oracles ran in my veins. No one in my family had ever had a false prescient vision. Even my uncle—fraud though he was in some respects—was reliable. After all, he had accurately predicted that I would find making history very hard work.

"Heads or tails?" demanded the girl, placing her hands on her flounced, impatient hips.

"Get your coat," I said firmly, my punctured faith again whole and intact, a kind of renewal I could hardly expect for the doomed overripe, tattletale mole on my forehead. But let tonight be tonight, and tomorrow be tomorrow! Suddenly I felt wonderfully free—although slightly puzzled at my ballooning insouciance. Why should I feel so invulnerable . . .? The answer came almost instantly, but even so I winced at having had to even ask. I slapped my head in chagrin, barely feeling my ugly mole through the thick callous of my history-making palm. Of course! In my new life, I was no longer a hostage to the future—all futures were hostage to me.

After all, I concluded, starting for the cloakroom, my head held high: On this world, the future was indeed in the palm of the hand . . . of the man who knew how to make history. ■

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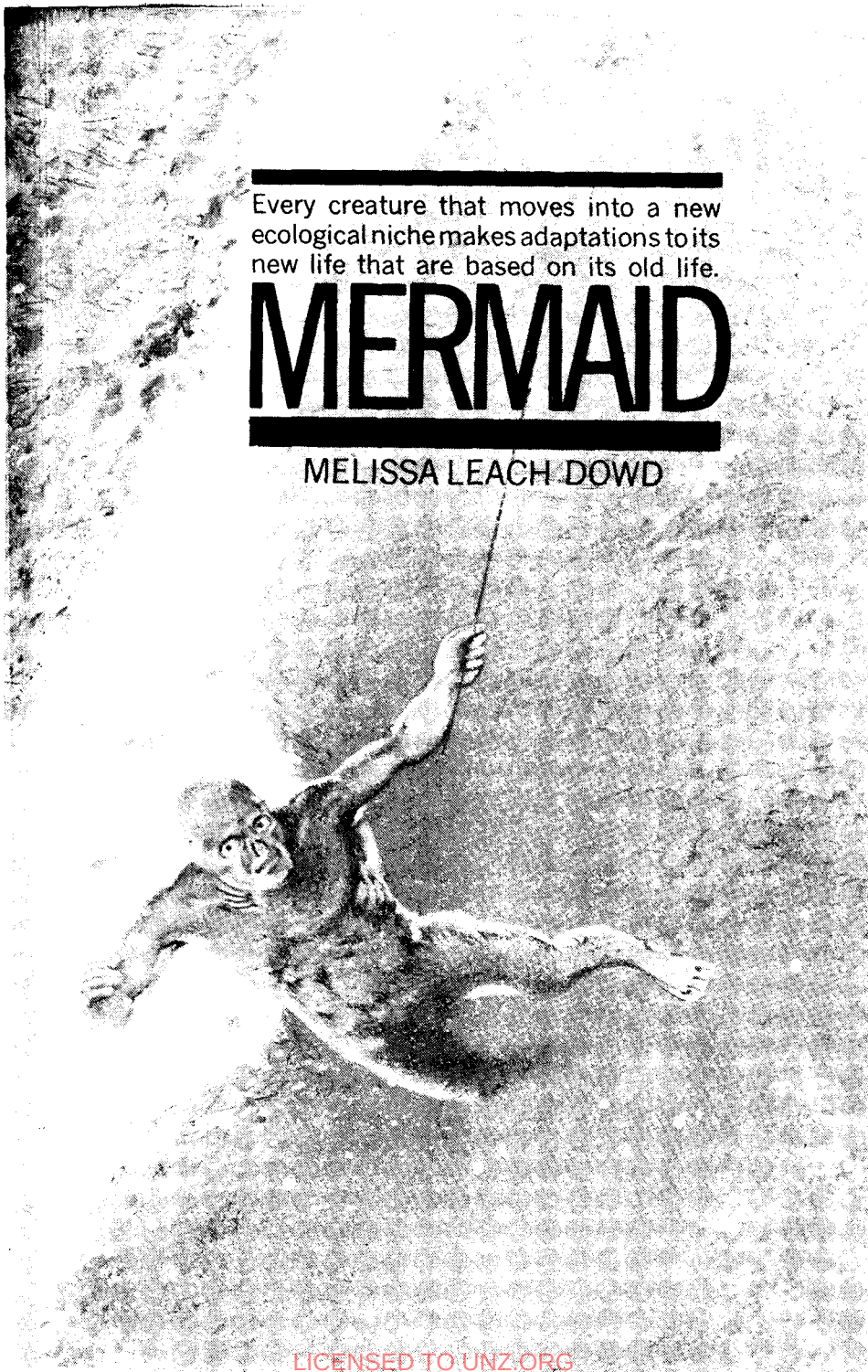
Every creature that moves into a new ecological niche makes adaptations to its new life that are based on its old life.

MERMAID

MELISSA LEACH DOWD



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It was early morning; she was the only one in the waiting room. Around her flowed the muffled clanks and rustlings of the unceasing hospital routine. She was glad the only eyes she had to face were professional ones; no detached observers sat across from her and wondered sympathetically about her casts and bandages. The medical personnel were inured to physical abnormalities, no matter how peculiar. The clinic was a small haven where she didn't have to fear intercepting a shocked or horrified glance.

What was the phrase her father had used? Self-inflicted, no, self-induced. Self-induced deformities. The words, those and all the others flung at her by her aghast parents when she revealed her plans, had played themselves over in her mind so often that she had grown accustomed to them, could even regard them with a kind of humor. It was less easy to face her own fearful anticipation.

She shifted restlessly on the soft seat, clasped her hands tightly and forced herself to wait with at least an outer semblance of calm. It was an effort to sit quietly, keep from tearing at the fabric of the chair with her fingernails. She tapped her fingers on the arms, wishing she could see the familiar, unmodified digits. The weeks of waiting for flesh and bone to heal had worn on her nerves; she wanted to see the worst, get the initial shock over with so she could learn to accept her new body.

Footsteps tapped crisply down the hall, halted at her elbow.

"They're ready for you," a feminine voice said easily. Cool fingers wrapped around her arm, tugged gently. She rose, followed the guide, heart thudding tremendously. They entered a room, the door swished shut behind them, and she was assisted awkwardly up onto the examining table. She listened nervously to the even footsteps moving efficiently around the room, heard the small sounds of metal meeting metal as instruments were laid out. She imagined the familiar gleaming rows of scalpels and sutures, gauze and alcohol.

The door popped open, and the surgeon paused in the doorway, finishing an anecdote to his companion. The door closed on a burst of laughter, and the doctor stepped over to her, still chuckling.

"Good morning," he said. His voice was low and well modulated, conveying just the proper amounts of warmth and distance. "Ready for the unveiling?" He fumbled on the tray. "Let's see how we did." Scissors sliced through the layers of bandage. Gauze fell away, tape pulled, and for the first time in weeks light glowed through her closed eyes. The surgeon carefully wiped away crusted fluids with cool liquid. She pulled her eyes open carefully, expecting pain. Feeling only a rough newness, she blinked

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up at the smiling face of the doctor. "Beautiful!" he said. He placed gentle fingers on her eyelids, holding them up. "Blink," he ordered. She squeezed, winced as with a tearing feeling a translucent gray film obscured her vision.

"You'll have to hold the primary eyelids back manually until you learn to control the muscles," he said, reaching for another tool. She blinked, and the new corrective lids flicked away.

Deftly, the surgeon stripped away the plastic casts, removed a stitch here and there, spent several minutes working the new joints in her feet. At last he stepped back and surveyed her, a pleased expression on his face.

She looked down and flexed her toes with a sense of wonder. Her feet were only a little longer and wider than they had been; the proportions had been altered carefully so she could walk without clumsiness. She spread her toes and the swimming membranes fanned out, wider than the palm of her hand. She waved them experimentally, thinking that they looked so thin, too frail to stand up to the pressure of the water. She gingerly touched the swellings at the base of her throat.

"The gills need another few days to heal. You can report to PT on Wednesday, and learn how to use all your new equipment." He scribbled busily on her chart. "Remember now, you didn't have the full operation. Your skin won't tolerate more than a few hours of immersion a day, and your body is still relatively sensitive to pressure. Don't try to be a fish." He shut the folder with a snap. "Good luck, Dr. Graham. I wish all my patients were as sensible as you," he said briskly, holding out his hand.

"I bet you wish they all had such a lucrative operation, too," she replied dryly, taking his hand briefly.

He chuckled automatically, eyes focused slightly to the side of her face. His mind had already left the successful operation, was considering the hours of routine before lunch. Flashing her a professional smile, he quickly left the room, leaving her alone.

Elizabeth stepped down from the table, walked carefully over to the mirror and examined the new face carefully. Her eyes were larger, bulged slightly due to the presence of the corrective eyelid, but he had slanted them somewhat, giving her an exotic, almost saurian look: different, but not repellant. Relieved, she turned her head from side to side, felt the puffy slits that would enable her to live underwater almost as easily as the marine creatures she studied.

She took a deep breath, let it out in a pleased sigh. It was odd, but not ugly, not grotesque as she had feared. She had no hesitation in meeting the world with such a face.

The tropical sun was well over

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the horizon, and Elizabeth, shivering at the edge of the dock, turned gratefully into its flooding warmth. She never got used to it being so chilly in the morning. Shading her eyes against the reflections sparking off the water, she scanned the ocean for a boat. Unfamiliar with the Bahamian waters, although she had always wanted to study along the Andros barrier reef, she had thought it prudent to hire a guide. Ben Tyro, the owner of the quiet resort where she was staying, had not hesitated to make a suggestion.

"Nickos is the best guide around here. Knows the reef like his own backyard—but you couldn't call him friendly," he added cautiously. "In fact, he can be downright obnoxious."

"I don't care about his personality. All I need is somebody to get me there and bring me back, show me some of the garden spots."

"Nickos is your man, then," he said congenially. "I'll send word."

There was no sign of a boat. With a sigh, she lay on her stomach, gazing off the edge of the dock into the clear water. Sea urchins glided slowly along the bottom, long black spines waving lazily. Green chitons clung to the rocks, nosed by tiny fish. A few feet away she could barely make out the outline of a small ray, patiently waiting in sandy camouflage. She dropped small chunks of wood into the water, absorbed in watching the minnows gather hopefully, looking for food.

The bump of the boat against the dock made her start. She stood up quickly, then bent down to pick up her towel and bagged lunch, hoping she hadn't shown any surprise. Her features composed, she stepped across the dock, smiled down at the man in the skiff. "Are you Nickos?" she asked pleasantly.

He scowled. "You waiting for guide?" he countered. When she nodded, he reached up a hand to help her into the boat. She took his hand cautiously, uncertain how to grasp the webbed fingers. Hopping lightly into the boat, she glanced around, dropped her gear into the bow.

"No motor?"

He shook his head. "Noisy," he grunted. "Plenty of wind this time of year." He shoved off from the dock, headed the small boat out into the wind.

Curious, but very little rebuffed, she leaned back and covertly examined her guide.

He was close enough to being human in appearance so that the eye wouldn't take in the difference at first, but in a few moments, the details would at last shock the mind into recognition. A surgically altered amphibian like herself, he had undergone the full operation, and his surgeon had made no attempt to preserve any appearance of normalcy. Skin had been restructured to withstand long immersion in salt water; it glistened

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slightly, felt tight and rubbery. He was completely hairless, as far as she could see, had slits for nostrils, no external ear at all. His eyes frankly bulged. But through the alien skin showed the familiar muscles of a well-developed human male, and he exuded an animal confidence which was attractive. She tried to imagine what he had been before the operation. From his name and stocky build, she pictured an aquiline profile, clusters of dark curls and smooth olive skin—then smiled at herself for constructing a Hollywood Greek. Elizabeth decided that his strangeness was easy to get used to, although he somehow clashed with the absurd normalcy of a pair of khaki cutoffs and sun-faded shirt.

"Do you have any particular spot in mind?" she asked, trying to reopen the conversation.

He turned and stared at her coldly for a long minute before answering. "You know these reefs? You want a guide?" He shifted his seat at the tiller, looked pointedly away over the ocean.

All right, she said to herself. I won't be nosy.

Her companion's somewhat sullen taciturnity couldn't keep her from feeling the perfection of the day, the feeling of sun and wind on skin that had been shrouded all winter against the cold. It would be bright and clear beneath the surface, with none of the racing shadows that made observation confusing on cloudy days. She watched the ocean with pleasure, hoping to see a school of porpoise as a good omen. None of them appeared, but she felt confident of the day's success. Occasionally she caught a glimpse of a shadowy form as they glided over the coral heads, and she became impatient to stop and submerge herself in the world passing dimly beneath them.

It was really only a short time before Nickos brought the skiff around and dropped the anchor. Elizabeth immediately began unbuttoning the shirt she had worn against the sun, peered overboard to estimate their depth—no more than twenty feet.

"You want me to stay with the boat?" Nickos asked.

Elizabeth shook her head. "Not as long as you set the anchor good," she said easily. Without waiting for a reply she slid into the water, feeling a little foolish. The feeling vanished from her mind as the water closed into a silver ceiling over her head. It took a few minutes of gulping and subdued fear before she could make the transition from lung to gill-breathing, then, in jubilation and relief, she arrowed down to the bottom, arms tight to her sides, the membranes between her toes fanning out. She brought herself up in a slow swoop, euphoric at being in the open ocean unencumbered by scuba gear; in spite of the scientific detachment she felt she ought to

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possess, she had always felt that the marine environment was another, lovelier world. The desire to be more completely a part of it had motivated her decision to have the operation more than the fact that it would help her work, she admitted to herself. She hung beside a mushroom-shaped coral head and looked around.

Her vision was good; the second eyelid corrected somewhat for her own visual abnormalities, so that she could see farther and clearer than with a face mask. The ocean floor was white sand, broken by coral heads and, a few yards away, a broad shelf of staghorn coral. The area was a soup of varied and colorful creatures: a French angelfish, looking like a living room ornament in its black-and-gold splendor, bent and flipped a few feet away. A school of squirrel fish was swimming purposefully along, and, on the coral head at her hand she could see a feather worm raking even smaller organisms from the water surrounding it, encompassed on all sides by the coral animals themselves, hundreds and thousands on that coral head alone. The sea, she reflected, literally teemed.

A shadow passed overhead. She shrank back automatically, glanced sharply upward, expecting to see a shark or a large ray.

It was Nickos. Legs pumping powerfully, he passed quickly, heading for the hedge of staghorn coral. Naked, carrying a spear in one hand, he looked like some half-forgotten legend moving in the living sea. Muscles rippled in his thighs and back, carrying him rapidly out of sight. He seemed totally a creature of the water; made her feel a puny white interloper.

"I'm still an intruder," she thought. "A few hours, and I have to return to the air. He looks like he could stay down here forever."

With some of her elation departed, she mechanically went through the regimen of tests and exercises she had planned, then turned and swam as hard and fast as she could out to sea, watching the bottom unroll beneath her. Nickos had brought them to the very edge of the shallow water; the bottom inclined rapidly to a depth of (she thought) eighty feet, then, with an abruptness that startled her, vanished. She swam down. There was a cliff, then nothing; a chasm that extended further than her sight, a pool of blue deepening into violet. Her body, without the buoyance of air-filled lungs, sank slowly if she held still. Enthralled, she looked down into the depths and allowed herself to drift slowly down. If she looked away from the cliff edge there was nothing to see but the color: she was suspended in a blue sphere, or, more nearly, floating through blue vapor—Alice down the rabbit hole . . .

With a start she realized that she had slid quite far down the cliff. Heart pounding, she swam up in

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the direction of the boat, knowing that she could have easily let herself sink bemused to her death. Nitrogen narcosis? She wondered. No, since she wasn't breathing compressed air, she should have no trouble with nitrogen. She put the image of herself falling slowly into a blue void out of her mind, surfaced, and hauled herself into the boat.

She reflected briefly that she had found the perfect, painless suicide, then stretched her legs out in the sun and reached for her lunch.

Nickos broke the water about an hour later. Elizabeth was half-asleep, face shaded from the sun by a towel. She sat up drowsily as he vaulted into the boat. He dropped a fish onto the deck; another still struggled on the end of his spear. He pulled on his shorts and sat down without comment, apparently oblivious to her presence. Elizabeth decided to abandon finesse, and asked bluntly, "Why did you have the operation?"

He was busily gutting the fish. He tipped the entrails into the water, paused and eyed her. "The sea has always been my life," he said simply.

"I've always been attracted to the ocean, felt a tie," she agreed, glad to find a common ground. "I suppose it's the main reason I work at the university. I'm a marine biologist," she added, waiting for him to be impressed.

He sliced a fillet from the first fish, cut off a piece and popped it into his mouth. He smiled at her raised eyebrows. "The sea," he said portentiously, "has a way of extracting a toll from those who take her too lightly or approach her without the proper devotion." And that was apparently the sum of his comment. He began cleaning the other fish.

"You're going to attract sharks," she said coldly.

"I'm not afraid of sharks." He eyed the horizon. "Squall blowing up anyway. You won't get in the water again today."

There was a brief silence. Elizabeth eyed Nickos narrowly, trying to think of a way to open him up a little. He was very sure of himself.

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seemed almost contemptuous of her. Well, she could take advantage of that, although it would be painful if he saw through her.

"I've been having some trouble making the change from lung to gill," she said. "Did you notice anything like that at the beginning?"

He hesitated, turning his knife over in his hand. "Practice," he said finally, but the tone was a little less curt.

"The aftermath of the operation is confusing to me," she admitted, "mentally as well as physically. The reaction of family and friends—did your family object?"

"My father is dead," he growled. "But if he were alive, he would be proud. All his life he took his living from the sea, and in the end, his death from the sea as well." He looked out over the open ocean, his hands pausing in their work. Then his right hand tightened spasmodically on the knife handle, and he made a motion as if to slash. "They will pay," he said in a guttural voice. "The sea will make them to pay." Coming to himself abruptly, he scowled at her and tossed the rest of the fish overboard. Realizing that the conversation was definitely finished, she pulled on her shirt and lay back in the bow as he prepared to get under weigh.

That evening in the lodge, Elizabeth picked up a drink at the bar and strolled over to Tyro, who was just finishing a spirited exchange with a fellow Canadian on American politics. She waited until the other man departed with a final remark, then sat down at the table across from the lodge owner.

Tyro was shaking his head ruefully. "Papa done told me, never talk politics sober," he said. "Once in a while, I forget."

"I've been here three days, and you've started an argument every night so far," Elizabeth commented. "But that's beside the point. I want to talk about Nickos."

"Well, that's easier than politics," he said genially. "What do you want to know?"

"He said something about his father—taking his death from the sea, was the way he put it. And then he said somebody would pay—what was he talking about?"

Tyro lifted his eyebrows. "You must have hit it right off. I never heard him refer to it before. His father was a fisherman on the big island, until SeaFarm started up. Ruined his business, of course, and the old man couldn't take it. Took his little boat out in a storm, and never came back."

"Ugh," she said, wrinkling her nose.

"Yeah, it was a shame. I was just starting this place up then, and tried to get the old man interested, but he wanted no part of it. Nickos took it real hard—watching his father go out day after day on the boat, still trying to make a liv-

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ing. I bought my fish from him, but it wasn't enough to keep him going. The inquest made it accidental death, but I personally think the old man decided it was time to cash in. Don't blame him much—his whole way of life was gone."

Elizabeth shook her head, absently making a pattern of water rings on the table with her glass. "He said something else," she said slowly. "I was coming up the dock, and he called after me. Said he could teach me more about the ocean than I could learn from a book."

"I'd bet on that. I've known Nickos since he was about nine years old, and most of the time he was in the water. He can tell you stories. . . ." He shook his head.

"Maybe I'll take him up on his offer, then," she laughed.

Tyro looked a little doubtful. "Keep your wits about you. Nickos is a little reckless. Don't let him talk you into anything." She waved a hand. "No worry. Thanks for the warning."

He smiled. "Papa also told me not to give advice to anybody more than ten years younger than me. But I can never remember that one either." He stood up and winked at her, then left with a bellow, breaking into an argument on the other side of the room.

Elizabeth lifted her glass to her mouth and swallowed reflectively. Nickos had told her to be on the dock at dawn. She had intended to sleep late, just to let him know that she had plans of her own which did not include getting up at dawn. But, he was an interesting person, and she was willing to break up her vacation to see what he wanted to show her—for a couple of mornings at least. Dawn found her stepping into Nickos' boat, ignoring the look of triumph on his face.

The next days were a time removed, set apart in a different frame from the rest of her life. Nickos dropped the guise of moody silence that enveloped him, became a man burning with a solitary flame. The first morning he took her on a twisting tour of the reef. He did indeed know the garden spots. Elizabeth was impressed enough to stay out past her lunch and on into the afternoon. She finally halted him and signaled that she wanted to return to the boat. He frowned, then seemed to consider and abruptly led the way back.

"That's fantastic," she gasped, when they were back in the boat. "But that's enough for one day."

"If you like. Tomorrow we will stay longer."

"Not me. I'm not ready for this yet."

"You will be fine. In a week, you will almost be in shape."

"If I did this much swimming every day, in a week I'd be back in the hospital." She began toweling her hair. Nickos sat at the tiller, scowling at her.

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"I will take you back to the lodge now. You ask Tyro for another guide," he growled.

She put down the towel. "Why?"

"You say you want to learn. I can teach—but it must be my way. If you do only half of what I say, you will never know what I want to show you. Perhaps," he said insolently, "it is too much for a woman."

She frowned at him, considering. For some reason she felt alarmed; she knew he was trying to browbeat her into acceptance, but somehow she couldn't quite laugh it off. All right, she said to herself, maybe he's just a megalomaniac, but maybe he really could show me a thing or two. And I came here to study, to learn, didn't I? But another voice said, no, no, you don't know what you're getting into, don't do it . . . she struggled with herself for a long moment, then when Nickos got up to draw the anchor she said suddenly, "All right. Your way. I'm in training, is that it?"

The phrase seemed to please him. "Training. Yes." He smiled.

She looked away. The expression on his face was gloating . . . or was it? Imagination, she told herself. She was silent on the trip back to the dock.

"Tomorrow dawn," he said as she clambered up onto the dock.

"Yes," she agreed, heading toward shore. She felt that a bridge of some sort had been crossed—she felt both eager and apprehensive to see what the next days would bring.

They spent hours beneath the surface, following the schools of food-fish, peering into cracks and crevices where the shy octopi hid, and moray eels lurked, waiting for darkness and the time to hunt. When they finally emerged with the setting of the sun, Elizabeth would be spent and numb with cold, too tired to wait in the dining room, too tired to do more than return to her cabin and fall into exhausted sleep, huddled in blankets. Every day he drove her body to its limits, and every evening, as they sailed back towards the land, he pounded her tired mind with argument. He declaimed against the human race, using the same words used so many times for the same purpose. Men were animals, he said: Sheep, that they let themselves be led by the nose to the slaughter of war, ants, that they were willing to kill any with the wrong herd smell . . . at first she would argue with him, but he always had a ready answer for her protestations. She had heard it all before, but from him, the familiar tirade seemed somehow more valid—he had, after all, retreated from the human race. She began to agree with him at last, or rather, she ceased to disagree. It had become too much trouble to form a defense against the bludgeoning words. At his insistence, she

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avoided the other guests at the lodge—she was too tired to spend much time socializing anyway—even ceased to bring her lunch with her every day. She ate raw fish as he did; raw fish, and the soft inner flesh of sea urchins, and once a clutch of sea turtle eggs. Weight fell off her, between the high protein diet and the constant exercise, but, she realized, she was actually in better condition than she had been in years . . . if she could only get enough sleep, could only get warm.

As the month wore on, and she caught Nickos staring at her with burning eyes, she began to dimly understand that this was more than a man sharing a loved idea, he was a prophet, and she was to be a disciple. They were in constant contact physically, and she waited for the inevitable sexual conquest, but it never happened. She didn't bother to wonder why, just as she wouldn't have bothered to put up even a token resistance.

Suddenly, there was a respite. Nickos told her curtly at the end of one day that he wouldn't be back the next day, or the next.

"Get some rest," he said. "The moon is almost full; we'll be going out at night." She stood up to leave the skiff, almost weeping with relief at the idea of two full days to sleep, and to eat, but he caught her arm above the elbow and pulled her roughly around to face him.

"I want you to go back to the clinic," he said softly, round eyes staring into hers. His breath puffed against her face; it smelled of fish. He released her and she turned to go, uncomprehending. Then the import of what he had said struck her and whirled her around. He was still standing, head back, watching her appraisingly. She closed her eyes for a moment, then pulled herself onto the dock, started for shore with heavy feet. When she raised her eyes she saw Tyro standing at the door of the lodge, eyes full of concern. She turned her face away and hurried to her cabin. It would be impossible to face the friendly questions and paternal advice she knew he was dying to give . . . later, after she had had some sleep.

She spent the two days in a luxury of idleness, lying in the shade, wolfing every meal, and spending most of the time in drifting sleep. The laughter and conviviality of the other guests were like bright visions from another world. She felt slightly ashamed about enjoying herself; these were the very frivolous wealthy people who Nickos saved for his most bitter invective, because they could idle away hundreds of dollars while other people in their own cities starved. She agreed with him, but, she said to herself, these people weren't evil, they didn't have their feet in the faces of the poor the way Nickos said . . . mostly she just enjoyed

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herself, and avoided thinking of motives and mores.

The first moonrise found her waiting restlessly on the dock, a little uneasy. She had been on night dives before, but always with the comforting presence of bright lights and other people. She was nervous about facing a dark ocean with no other resources than the ones she was born with, and Nickos was a shaky refuge. She wasn't sure whether he would protect her in a crisis, or allow her to be served up as a sacrifice, one of *those who took the ocean too* lightly. When the skiff finally ground against the dock she climbed in, and if Nickos noticed the knife strapped to her calf he said nothing about it.

Once under the surface she began to relax. There was more light than she had expected; the water was flooded with a silvery ethereal glow that carried with it a mood of enchantment. From her studies she knew that the reef had its diurnal and nocturnal inhabitants like any other system, but she had never seen the change with her own eyes before.

The omnipresent tiny fish were gone, safely hidden in crevices away from the hungry prowlers. They passed a parrot fish hovering motionless in the lee of a coral head, partially covered by an envelope of ectoplasm. Nickos darted away from her suddenly; following, she saw that he had found a marauding moray eel, some six feet of green ferocity, prowling for game. He teased it with the tip of his spear, engaged it in a twisting dance. Frustrated in its attempts to reach and bite, it writhed away, disgusted with the game. He watched it go, spear still poised, confidence and mastery expressed in the lines of his muscular body. He turned and swam away, leaving her to follow. His spear flashed suddenly, and he retrieved it in triumph, a red snapper impaled and writhing. Elizabeth shook her head. Of all the spectacles of the reef, the violent bloody ones seemed to delight him the most.

She felt the shark before she saw it. With a lifting of primeval muscles along her spine, she knew that a threatening presence was near, turned and grabbed the knife out of its sheath in the same motion. It was good sized, ten feet or more, impossible to be sure in the deceptive moonlight. It circled, nosing in, in response to the blood or the vibration of the dying fish. She swam slowly closer to Nickos, saw by the widening of his eyes that he had seen it too. She placed herself at his back so that one of them always had the circling beast in view. With a sinking feeling she saw another great fish come to join its fellow. Nickos' eyes were alight, lips drawn back from his teeth in a feral grin. With something approaching wonder she saw that he hadn't

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thrown away the fish. He's gone over the edge, she thought, he's bent on suicide, and me with him . . . One of the sharks swerved in suddenly. Her mind screaming, Elizabeth fended it off with her feet, kicking it with all the force in her legs. It darted away to resume its path a few feet farther out. It was a respite, but she knew it would be a brief one.

Before she had time to think of a defense, a way out of the hopeless situation, Nickos took the knife from her hand and dropped his spear. When the nearer of the two fish swerved after it, he followed its motion and struck, jabbing the shark in the eye. It turned, lunged its great body around and Elizabeth half-closed her eyes, expecting to see Nickos torn and mauled. With a fluid movement he avoided the great jaws, jabbed the fingers of his other hand into the beast's remaining eye. It voided a black cloud of excrement and Nickos dropped away from it. The other shark, with a movement too fast to follow, turned and tore out a hunk of flesh, shook its head with a bulldog shudder and gouged another mouthful from its now dying companion.

Pulses surging with adrenalin, Elizabeth fought down an urge to flee blindly and swam slowly away, praying the maddened fish wouldn't be attracted to her movement. Nickos followed her slowly, eyes on the carnage behind them. She turned away and didn't watch to see whether he followed her or not. She sobbed once when she broke the surface, vaulted into the boat and shook silently in savage reaction. She looked away when Nickos entered the boat. His eyes were glazed, but not, she knew, with fear. The trip back to the dock was made in silence.

Back in her cabin, Elizabeth turned on the shower, stripped off her suit and stood in the pounding hot water until the horror receded from her mind. Still dripping, she flung herself on the bed and covered her face with her arm, trying to sort out her thoughts.

Nickos wanted her to return to the clinic and have the full operation. He didn't want a follower, she realized, he wanted a mate: that was why he had never touched her. She lay sleepless for a long hour and thought: re-examined her ideas, and particularly her motives at having the partial operation.

It had seemed like such a wonderful idea, an inspiration. She enjoyed teaching at the university, opening other minds to the delight she found in the creatures of the silent world. Her research she found interesting and fulfilling, and when the number of artificial amphibians grew, and the operation stopped making headlines, she had made her plans. When her leave from school was granted, she had gone home to spend a weekend with her parents, confident speech all pre-

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pared. "My body is an extension of the mind, a tool," she had said grandly. "I'm going to make it a better one."

She had expected them to agree, to be proud, even. She was totally unprepared when, after the first stunned second, her mother cried and her father stormily forbade her to think about such a thing. She had left, hurt and angry, and after the operation, sent them a cold little note inviting them to come and see her after they got over their emotional storm . . . she knew they would never come. She had run away from the situation, and, deep within herself, she was ashamed.

She thought of Nickos, of his dark body gleaming silver, of the light in his face when he watched the great tiger of the ocean torn by its comrade. Purporting to despise the predator in man, what was he but the predator unveiled, stripped of any concealing vestige of civilization. His way was perhaps more honest, but to her it was nothing but terror and blood. All the same, she was determined not to run away again . . . she finally fell asleep, every nerve exhausted, her thoughts roiling in her brain.

The next night was eldritch, a night of wind and thin clouds scudding over the moon. She sat and kicked her heels over the edge of the dock, waiting for the white sail to appear in the gloom. Nickos, when he tied up to the dock, eyed her clothing but offered no comment.

"I'm leaving in the morning," she said quietly. She waited, but he said nothing, stood with one webbed hand curled around the mast, the shuttered expression back on his face. She groped for words.

"You may not understand, but *I* have to do what's right for *me*. You've made a decision, and chosen a way, and that's fine, but it's no good for me." She shook her head. The other words dried up in her mouth, and she stood up and deliberately walked away, into the lodge and the laughter.

It was a bright, beautiful day. Elizabeth walked into the biology office and picked up her mail. There was the usual junk, which she dropped into the wastebasket automatically, a note from her mother, and a letter from Ben Tyro. She tore open the letter on her way up the stairs, puzzled that Tyro would write to her. She dropped her books on her desk and frowned at the piece of paper, then gave an involuntary exclamation.

"What's up?" asked her roommate.

She waved the letter. "Nickos is dead." She read the passage aloud: "Thought I should let you know," it went, "one of the other guides found Nickos in his skiff, dead from loss of blood. Shark got him, probably, which isn't too surprising, considering Nickos' habits. It's a

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damn shame . . ." She stopped, surprised to find that she was suddenly and unreasonably angry. "Goddamn," she said softly, tears welling into her eyes.

The other woman raised her eyebrows. "I would think that you hated him."

"I did, at first," she said, putting the letter carefully away in her desk. "But that was just reaction. After I had time to think, I was grateful."

"Grateful? How!"

"Well, he taught me something, something important, about tolerance. And about individuality, too, I suppose," she said slowly.

"I can follow you as far as the tolerance, but what could he have taught you about individuality?"

"That if you really walk your own path, and say to hell with the rest of the world—"

"The world will say, 'To hell with you'?"

"Yes. I suppose. I can't really put it into words very well." She stood up and walked to the window. "I don't want to talk about it anymore," she said, interrupting her friend, who was beginning another comment. The woman shrugged and returned to her work.

Elizabeth stared out the window, where, some hundred miles away, there was an ocean. There would be a full moon that night. ■

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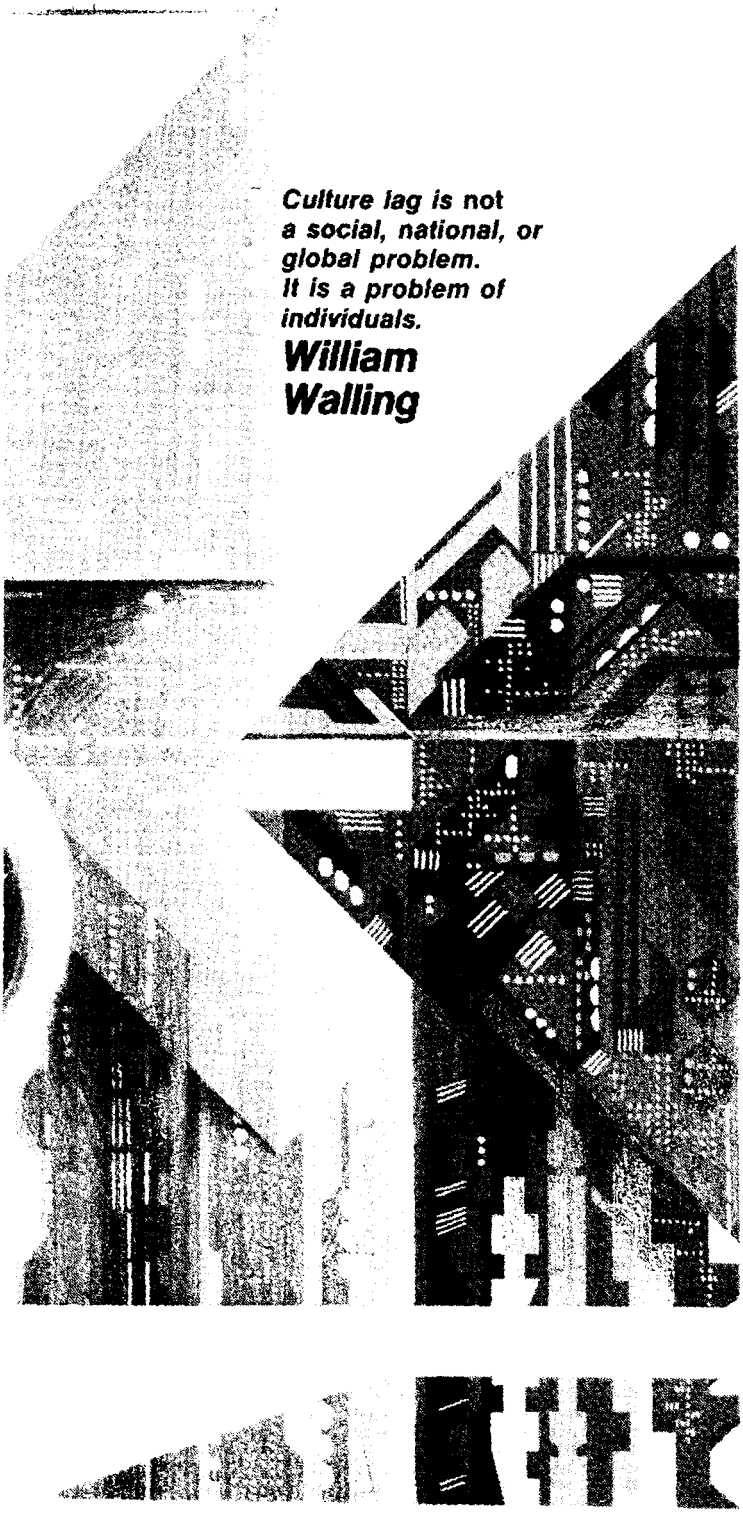

Culture lag is not a social, national, or global problem. It is a problem of individuals.

William Walling

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(Tre-áhzh) [*Fr. "sorting"*]. Classification of casualties of war, or other disaster, to determine priority of treatment: Class 1—those who will die regardless of treatment; Class 2—those who will live regardless of treatment; Class 3—those who can be saved only by prompt treatment.

We have met the enemy, and he is us. From Walt Kelly's cartoon strip, *Pogo.*

The man waited with outward patience, standing stiff-backed, knees together, opposite the desk where a nervous male secretary feigned work under his punishing scrutiny. Seemingly quite at ease, the man was tall, forceful in appearance, with a proud aquiline nose, sleek dirty-blond hair, and chill hazel eyes. The wraparound collar of his pearl-gray jacket was buttoned even though a power brownout had once again paralyzed Greater New York during the night and early morning hours, leaving the anteroom overwarm and stuffy.

The secretary darted occasional furtive looks toward the tall man. At last, their glances crossed. The secretary squirmed. "Sorry . . . for the delay, Mr. Rook. I can't imagine what's keeping her."

"Madame Duiño is busy, Harold." The man folded his arms. "Don't trouble yourself; pretend that I'm not here."

"Yes, sir." The secretary plunged back into his paperwork. When the intercom buzzed, moments later, he said hastily, "You can go right in now, sir." The inner door eased shut; the secretary looked immensely relieved.

The office of Dr. Victoria Maria-Luisa Ortega de Duiño, Chairperson of the Triage Committee, UN Department of Environment and Population, was as severe and desiccated as the woman herself. A blue-and-white United Nations ensign hung behind her desk on the left; on the right, atop a travertine pedestal, the diorite bas-relief presented to her by Emilio Quintana, Mexico's preeminent sculptor, depicted a stylized version of UNDEP's logo: the globe of Earth, with a set of balanced scales and the motto TERRA STABILITA superimposed across it. A pair of guest chairs hand-crafted of clear Honduras mahogany were adrift upon a sea of wall-to-wall shag the color of oatmeal. Save for an old-fashioned French pendulum clock, and the floor-to-ceiling video panels—now dark—Sra. Duiño's sanctum was enclosed by barren, oyster-white walls. Lined damask draperies shrouded a picture window overlooking the East River ninety floors below.

Rook did not take a seat. He chose a spot just inside the door, studying the old woman with an indolent expression.

If aware of the man's presence, Dr. Duiño gave no sign, occupying herself with the sheaf of papers be-

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fore her on the desktop. Her hair, as short and brittle as her temper, was roached stiffly backward to form a platinum aura; her features were wrinkled, sagging, though her eyes retained the dark and shining luster of youth. Around her frail neck, pendant against the lace *mantilla* thrown over her shoulders, was a large silver crucifix. In six months and eleven days, Victoria Duiño would celebrate her eighty-eighth birthday. She was the most reviled and detested human on Earth.

"My apologies, Bennett." The old woman looked up at last. "Please sit down. I had not intended to keep you away from your desk so long."

"Quite all right, Victoria." The tall man made it a point to remain standing. "I take it the matter is pressing?"

"No. Not really." She touched a button; a hologram condensed in the largest video tank across the office, allowing them to eavesdrop on a courtroom scene. Now in its penultimate stages, the trial was taking place half a continent away. "I merely wished to assure myself that we were obtaining full PR value from the Sennich Trial," she said. "Have you been following it?"

Bennett Rook turned with leisurely grace. He listened briefly to the defense attorney's final plea. "Alas, no," he said. "Actually, I've been too busy. Is it the gluttony action you mentioned in your memo?"

The old woman made no rejoinder. Her interest in the trial was exclusively political. In her mind, the guilty verdict soon to be handed down was a foregone conclusion. One Nathan Sennich, and a pair of miserable codefendants, had resurrected the ancient sin of gluttony, which reflected but one symptom of an ailing society in her opinion. But, for UNDEP, the trial carried important propaganda overtones; widespread public indignation, fanned by tabloid journalism, had begun to create a welcome avalanche of letters and calls. If UNDEP press releases were to add fuel to the fire, were to milk the sordid affair for all it was worth . . .

"The gall of those swine!" she said. "In a starving world, they dared slaughter and gorge themselves on the roasted flesh of a fawn stolen from Denver's zoo."

Rook's lip curled. His voice was resonant, unruffled. "Grotesque, Victoria. But I can't imagine what's in it for us. In forty-eight hours, or less, the remains of our mischievous gourmands will be fertilizing crops in Denver's greenbelts; or perhaps those of the Denver Zoo itself. Poetic justice, eh?"

"Don't make light of it." A throaty burr crept into Sra. Duiño's voice. "I asked you to get PR cracking on this action. You have ignored my request. We stand to reap a certain amount of public sympathy if trial coverage is prop-

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erly handled, Bennett."

"We?" The man's brows lifted. "Triage Committee? Nothing could improve our image, Victoria. Day before yesterday, *L'Osservatore Romano* once again referred to you as the 'Matriarch of Death'. PR abandoned all attempts to 'sell' the committee years ago."

"You know perfectly well what I meant," said the old woman tautly. "Bennett, must we always fence? Can't you ever sit down and converse with me sociably?"

Rook smiled an arctic smile. He rocked on his heels, returning her stare with steadfast calm. "There are several matters we shall never see in the same light, Victoria. Nothing personal, you understand; if you want the truth, I rather like you. If I did not, I would tell you so. I am no hypocrite."

"No," she agreed, "you are not a hypocrite. Blunt, perhaps; but not a hypocrite."

He made a slight gesture, turning over the flats of his hands. "Blunt, then, if you will."

Dr. Duiño watched him with unwinking concentration. "I want your cooperation," she said, "not your enmity."

Rook sighed. "I'd rather not discuss it."

"Why not? Are you afraid?"

Rook tensed the least bit. "I'm afraid of nothing. Pardon me; of almost nothing."

"Your use of a qualifier makes me curious."

"My only fear," he said slowly, "is for the continuation of our species."

"And mine, Bennett. But that is what we are laboring so earnestly to ensure."

"To little avail," he said.

"That is not a fair and reasonable statement."

"Oh?" Rook stood firm under her withering gaze, his eyes aglow with patriotic fervor. "You are familiar with this week's global delta, of course."

Victoria Duiño hesitated. "I am. It is most encouraging—less than one-quarter of one percent."

"Bravo!" Rook clapped his hands in genteel emphasis. "Despite our sanctions, proscriptions, lawful executions and extensive triage judgments; despite floods, earthquakes, plagues and the further encroachment of desertlands upon our remaining arable soil, there are now some twenty-five thousand *more* human beings on Earth than the nine and three-quarter billions we could not feed last week. And you tell me all's right with the world."

Sra. Duiño looked taken aback. After a moment, she said quietly, "Zero population growth will be a reality in one and one-half to three years."

"Too damned little, Victoria—too damned *late*. With sterner measures, we would be on the downslope instead of approaching the crest."

"I am familiar with your views,"

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said the woman. " 'Sterner measures', as you call them, would have made us less than human. I refuse to subscribe to inhumanity as a cure-all for the world's ills."

"Humane philosophy is a luxury we cannot afford."

"Bennett, Bennett! You are intelligent, industrious, thoroughly dedicated; that is why I selected you from the crowd these many years past. But have you no compassion, no slight twinge of conscience for the dreadful judgments we must pass day after day, month after month, year after year?"

"None," said Rook. "It's an interesting facet of human nature: mortal danger to a single individual—the victim of a mine disaster, or someone trapped in a fire—never fails to stimulate a tidal wave of public sympathy, while similar disasters affecting gross numbers are mere statistics, hardly worth a shrug. We do what must be done. We do it analytically, dispassionately, dutifully. Were it otherwise, there would be no sane committee members."

"I . . . see. And you think me a senile, idealistic old fool who should step aside and allow a younger individual, such as yourself, to chair the committee?"

Bennett Rook stood perfectly still. "Senile? Hardly. Your mind is clear and sharp as ever; you are one of very few who can best me in debate. Idealism I will not answer; I am not qualified. But you are less of a fool than anyone I have ever met. I admire you vastly, respect you enormously, even love you in my own manner, perhaps. Yet, given the opportunity, I would replace you tomorrow."

"Because I am too soft?"

"Because you are too soft," he said.

"Thank you for stopping by, Bennett. May I remind you once again to prod PR on the Sennich Trial coverage?"

"I'll take care of it immediately." Rook tipped his head; there was nothing sarcastic about his deference. "Good day, Victoria." His eyes were veiled as he left the office.

In silent reflection, Victoria Duiño gazed at the closed door for quite some time before resuming her labors.

And the Egyptians will I give over into the hand of a cruel lord; and a fierce king shall rule over them, saith the Lord, the Lord of hosts.

And the waters shall fail from the sea, and the river shall be wasted and dried up. (Isaiah 19:4,5)

In midafternoon, the intercom's buzz interrupted Victoria Duiño's train of thought. "Yes, Harold?"

"Cardinal Freneaux is in the anteroom, madame. And your granddaughter is calling—channel sixteen."

She glanced at the clock. "If I am not mistaken, His Eminence

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made an appointment for three. It is now but two fifty-eight. Surely he will allow me two minutes to indulge my only grandchild."

"Surely he will, madame. I will tell him."

"Thank you, Harold." Keeping one eye and a portion of her attention on a flashing digital readout, Dr. Duiño switched on the vidicom. "Monique. I can't talk very long just now. I trust that you and Stewart are well?"

"Hello, Grandma." The image that formed in the small tube was of a petite, attractive young woman whose dark hair was in disarray. Her eyes were red-rimmed, desperate.

Victoria Duiño straightened in her chair. "What is it, child? What has happened?"

"I've got . . . big troubles, Grandma."

"What sort of troubles? Can I help?"

"Oh, God, I hope so! I . . . doubt it. I just got back from the doctor. I'm . . . in the family way, if you know what I mean."

"Monique!" Sra. Duiño clutched the arms of her chair. "How did it happen? Were you careless?"

"No. I don't know. I . . . took my pills. I never missed. I just don't know, Grandma. Fate, I guess—or bad luck."

After the first flush of emotion had washed through her, Victoria relaxed and began to think. She seized a yellow legal pad and a stylus. "I want to know where you buy your birth-control tablets."

"What? But, Grandma, what does that have to do with—?"

"Never mind, child. Just tell me. I assume you buy them regularly in one specific place?"

"Uh, yes. At Gilbert's Pharmacy here in the arcology complex. But I—"

"Have you any left?"

"A few," said the younger woman. "I think. Yes; a few."

"Send them to me. Mail them this afternoon—special delivery, and insure the package. Address it to Harold Strabough, United Nations Tower, and beneath the address write the initials V.M.L. That will assure prompt attention. I should receive it tomorrow."

"I . . . all right, Grandma. I will. Oh, Stew's so broken up; we would have been approved for parenthood within the year. What can we do?"

"Leave that to me."

"Can you . . . ? Do you think you can do something?"

"I think so, Monique. I want you to be as calm as you can about this. Follow the doctor's instructions verbatim, and let me know at once if any complications arise."

"Grandma, wh . . . what will they do to me—to my baby?"

"Nothing, for the time being," said Dr. Duiño with assurance. "Unauthorized birth is a crime; unauthorized pregnancy is not. We have many months to effect a solution. Don't be afraid."

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"Stew's talking kind of wild," said her granddaughter. "He's been raving about running off to Brazil."

"Hum-m-mph! To live in the jungle with the other outcasts, I suppose. Think about that, Monique. Would the Amazon Basin be a fit place for Stewart and yourself to raise an infant? It is a jungle, just now, in more ways than one. You wouldn't last long enough to give birth, let alone build anything more than an animal existence for yourselves."

"Are you sure, Grandma?"

"Absolutely certain," said the old woman. "I am in a position to know. Do exactly as I have advised. I'll call you later in the week when we have more time to chat. Above all, don't despair, my dear. Until later, then."

"God bless you, Grandma. And . . . thank you. I love you."

Seething inside, Victoria switched off the vidicom. She permitted herself the use of an expletive not in keeping with the dignity of her high office, then seized her bamboo cane and rose stiffly to stand upright, her mind whirling. Monique's call had come at a most inopportune moment; she had only seconds to contemplate its ramifications before receiving the Cardinal.

Diminutive and birdlike, she hunched beside the desk, squinting down at the carpet. It was an attack, of course. But from what quarter? She had been the victim of numberless attacks, both political and physical, during her long career. She had survived eleven attempts on her life, attempts ranging from clumsy bunglings like the homemade bomb thrown by that theology student in Buenos Aires which had permanently impaired the hearing in her right ear, to the ingenious poisoned croissants, four years ago, which had resulted in the death of a loved and trusted friend.

The old woman heaved a sigh, feeling something wither and die inside her. Damn them! There was no time to think about it now. No time. She closed her eyes tightly, washing the residue of Monique's call from her mind, and pressed the intercom button. She hobbled to mid-office, leaning on her cane.

His Eminence, Louis Cardinal Freneaux stood framed in the doorway, a wasted figure whose rich robe hung loosely about him. Victoria knew that he made it a point of honor to limit his caloric intake to something commensurate with that of the most deprived member of his vast flock. She respected him for it, and considered him one of the more intelligent churchmen in her acquaintance. Beneath the red skullcap, the Cardinal's eyes were lackluster and sad.

"You are looking very well, my dear," he said.

"Thank you, Louis. At my age, I can't imagine a nicer compliment."

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She bent stiffly as if to kiss the prelate's ring.

"That . . . is not necessary," he said, withdrawing. "My visit is official, I'm afraid."

Sra. Duiño straightened slowly. "Is it to be like that?"

"Please don't be offended, Victoria."

"I take it the Holy Father is even more displeased with me than usual," she said. "I am truly sorry to have caused him further pain. What is it this time?"

"Egypt."

The old woman nodded once. She turned slowly and stumped toward her desk, motioning the Cardinal to a chair. "Four million inhabitants of the Nile Delta, formerly Class Three, were declared Class One last week. I fear there was little choice; the vote was unanimous."

"Deplorable!" said the Cardinal.

"No one deplored its necessity more than I. Damanhûr, El Mansûra and Tanta, Zagazig, El Faiyûm and El Minya share the fate of numberless villages scattered along the dry gulch that was once a mighty river."

"There are many Coptic Christians in Egypt," said Cardinal Freneaux. "They have petitioned the Holy See for redress."

"Oh?" Victoria's dark eyes flashed. "And why, pray, have they not petitioned the Father and Teacher in Moscow who refuses to allow them to help themselves? More than a decade ago, UNDEP warned of what the Aswan Dam was doing to the Nile. The weight of Lake Nasser upon the land, swollen by spring floods in East Africa, helped create a severe seismic disturbance; the upper Rift Valley developed a subsidiary fracture, and the river found a new path through Nubia to the Red Sea. Today, Cairo is a dusty ruin, as dead and forgotten as the pyramids to the west."

"Rationalization is useless, Victoria." The Cardinal frowned. "We must be practical."

"*Practical*, is it? In modern Egypt, more than three thousand *fellahin* crowd every remaining square mile of arable land. *Something* had to give, Louis."

The Cardinal coughed apologetically. "Four million . . . somethings," he said in a low voice.

Victoria Duiño reacted as if the Cardinal had slapped her. "That was unkind of you. They are four million helpless human beings; they work and love and have aspirations and laugh together on rare occasions, even as you or I. Unfortunately, they also have appetites. Do you—does the Holy Father—suppose that we *enjoy* our work?"

"Of course not, Victoria."

"Then why does he refrain from exercising whatever influence he has over Eastern Orthodox churchmen inside the Soviet Union? Why can't they aid in making the Kremlin realize that its insensate drive

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for world domination is literally starving millions? With Soviet help instead of hindrance our triage activities would dwindle significantly."

Cardinal Freneaux made a small sound of disgruntlement. "You know how little public opinion is worth in Russia."

Sra. Duiño silently recited a Hail Mary, allowing her temper to subside. She tapped a stylus on the desktop. "Louis, the impoverished portion of the Third World sprawling across Africa, Asia Minor and the Arabian Peninsula is a Russian creation; it is perpetuated solely as a political weapon. Soviet-controlled military forces outnumber UN forces two to one; we are powerless to inflict our wills upon the Third World, save for the Indian subcontinent and South America, except as Russia allows. The Great Northern Bear graciously condescends to permit triage judgments rendered wherever and whenever we choose, then points a long propaganda finger and calls us 'murderers of millions'.

"But let us suggest something *beneficial*, such as the Qattara Project, and the Bear immediately exercises his veto. The measure dies without question of recourse."

Cardinal Freneaux looked uncomfortable. "I am not familiar with the project," he dissimulated, hoping against hope to divert the old woman's waxing anger.

"Really?" Victoria's eyes radiated pale fire. She spun a tickler file, then touched a series of buttons on the video controller. A full-color map of the Middle East formed in the large tank. "Just southwest of Alexandria, is El Alamein, a town of some historical significance. Near there, Britain's armored forces turned back those of Nazi Germany in one of the climactic land battles of the Second World War.

"Which is neither here, nor there, except that Britain chose that particular site to make her winner-take-all stand for an excellent reason. To the uninitiated, it would have seemed easy for Rommel's *Panzers* to swing out into the open desert, avoiding Montgomery's trap on his drive toward Alexandria and the Suez. Such was not the case; on a larger scale, the area is a corridor much like Thermopylae, and British strategy much like that of the Greeks who stood off the Persian hordes in classical times. You see, Rommel had neither the petrol, nor supplies, to skirt a huge natural obstacle.

"Let your eye drift southward from El Alamein, Louis. See the long crescent marked Qattara Depression? It is a vast sink rather like Death Valley, which lies between the Libyan Plateau and the Western Desert, and is more than four hundred feet below the level of the Mediterranean in most places.

"UNDEP's ecosystems engineers proposed a fifty kilometer-long ca-

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nal, excavated by use of 'clean' mini-fusion devices from a point east of El Alamein to the depression. A hydroelectric power station was to have been built on the brink; seventy years would have been required for a large, fan-shaped inland sea to form, stretching from Siwa Oasis near the Libyan border to the foundations of the pyramids at El Giza, with a long neck reaching southward along the Ghard Abu Muharik almost to El Kharga. The Qattara Sea would have altered the climate of the Western Desert, bringing rainfall to the parched, rich soil; in ancient times, much of the region was a garden. Egypt could have reclaimed millions of hectares of arable land, helping to alleviate her perpetual famine.

"The Father and Teacher in Moscow vetoed the proposal out-of-hand." With an abrupt gesture, Victoria switched off the video map. "Pardon me; I did not mean to lecture."

Cardinal Freneaux shifted disquietly in his chair. "You make it sound so brave and simple. The situation is much more complex. Visionary schemes, such as this Qattara Project—"

"There is nothing 'visionary' about it," she said in an icy tone. "I could name a dozen similar UNDEP proposals vetoed by the USSR."

The Cardinal ran his tongue around his upper lip. He rose and began pacing the office, hands clasped behind his back. "The Church is not blind," he said. "Russia's geopolitical game is far from subtle. Yet the Bear is not to be provoked, Victoria. His Holiness dreads war. Have you any concept of the carnage thermonuclear weapons would wreak among the vast populations of Asia, Africa, Europe and the Americas?"

"I have indeed; a global holocaust would either extinguish our species, or reduce our numbers to something the Earth could once again tolerate. Triage on a grand scale, Louis."

The Cardinal was aghast. "How can you even *think* such a thing?"

The old woman shrugged. "There are wars, and then there are wars. We are engaged in a global war right this instant, and one of the major battles is taking place in Egypt. If His Holiness refuses to recognize this fact, I am hard-put to explain it."

"I've never heard you speak like this before, Victoria."

Victoria sighed. "I suppose my optimism and diplomacy have begun to wear out, like the rest of me." She searched the Cardinal with her eyes. "No, that isn't true. Louis, we are not winning the war just yet. But, we will—must! There are, after all, only three alternatives left: triage, Armageddon, or a sniveling decline that is certain to end in a whimper."

Cardinal Freneaux remained si-

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lent for a time. "Our conversation has wandered far afield," he said. "Victoria, do you consider yourself a good daughter of the Church?"

"You know that I do."

The churchman pondered something invisible which had obtruded between himself and the old woman. He cleared his throat. "His Holiness was unusually stern when he dispatched me on this mission. He instructed me to plead immediate reclassification of the four million inhabitants of the Nile Delta. He urged me strongly not to take 'no' for an answer."

Victoria Duiño looked solemn. "Then the stern Father must discover that he has an equally stern daughter," she said. "My answer must be . . . no. Battles are never without casualties; grain shipments to Egypt have already halted."

"I warn you; he has spoken of excommunication."

The old woman grew very pale, very calm. "And do you expect me to be intimidated by such a threat?"

"I do not. I have known you too long."

"I am literally amazed that the Holy Father would stoop to attack me personally, would choose to threaten damnation of my immortal soul in order to destroy me professionally. Were he to carry out this awful threat, it would mean absolutely nothing to the Triage Committee or its works. Doesn't he realize that?"

"I'm not . . . sure."

Victoria fingered her crucifix. "Louis, what have we come to? The Church, our Church, has grown quite permissive on the question of homosexuality, now countenances therapeutic abortion, even condones euthanasia when the pain of life becomes too great for her sons and daughters to bear, yet obstinately faces away from the fact that without triage judgments our planet will *never again* be a fit environment for the human species."

"Discussion is painful to me. I must ask you for a definite answer, Victoria."

"You have had it. Tell His Holiness that the Matriarch of Death considers eternal fire a small price to pay for the work she does, and must continue to do."

The Cardinal's eyes were misted. He bowed. "Then I will bid you good-bye, my dear Victoria. I sincerely hope that our next meeting will be more pleasant."

"I hope so."

The causal chain of the deterioration is easily followed to its source. Too many cars, too many factories, too much detergent, too much pesticide, multiplying contrails, inadequate sewage treatment plants, too little water, too much CO_2—all can be traced easily to too many people. Dr. Paul Ehrlich, *The Population Bomb*

Monique's package arrived in

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late forenoon the following day. Dr. Duiño sent two of the suspect birth-control tablets to the UN lab for analysis, receiving a report in less than one hour. Properly stamped with the infertility symbol, the placebos lacked the chop of any pharmaceutical house, and were therefore quite illegal. If found, the seller would be liable to harsh prosecution.

After an evening snack of thin vegetable soup and soya toast, Sra. Duiño retired to her quarters high on the two-hundredth floor, feeling roughly battered by life. She had been attacked from the left and the right, from above and below.

She pondered Monique's problem all evening, sitting alone in the cramped two-room suite. She rarely left the UN Tower nowadays; there would be little purpose in it. Almost everything that remained in her life was here: her meager creature comforts, the small chapel on the twelfth floor where she heard mass and went to confession—more and more infrequently of late—and her work.

Sudden nostalgia spun her mind back to the early days in Argentina when Vicky Ortega, a serious-minded medical student newly risen from the tumbled shacks and endemic poverty of a Buenos Aires *barrio*, had visited the clinic and been lovestruck at first sight of a young doctor named Enrique Duiño. Love had come in the blink of an eye, in the macrocosmic slice of eternity it had taken for the handsome doctor to look at her infected throat and prescribe three million units of penicillin and bed-rest.

Oh, she had pursued him; no mistake about that—two months of thoroughly premeditated "accidental" encounters, while her studies went neglected and she lived in terror of losing him.

But she remembered the miraculous day when she had led Enrique up a crooked, debris-strewn alley to the ramshackle lean-to her parents and brothers and sisters called home, the day Enrique had turned his hat brim slowly, nervously in his deft surgeon's hands while he asked her father's permission to make her his bride. Later, mentioning the five children she'd prayed God would allow them to have, Vicky had received the lecture which was to change her life.

In those days, Enrique had been a walking encyclopedia, stuffed with demographic statistics, facts and figures on family planning, on the fantastic rate at which the world's population was doubling, on the coming extinction of fossil fuels, and on and on. They, he had insisted, would have *one* child—two at most. At first, Vicky had been horrified, then resentful, then fascinated.

Their first decade together had been an exciting hodgepodge: the missionary hospital in Bolivia; their studies together in Madrid, and at

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the Sorbonne, and later in Mexico; finally, the years in America and, somewhat late in life, the birth of young Hector Duiño. That had been the richest, most tranquil period, Victoria reflected. Enrique and she had practiced in San Francisco, and in New York; the boy had grown to manhood almost overnight, so it seemed. And when Enrique's crusading articles won him selection as a delegate to the third International Population Control Convention in New Delhi, she had been so proud, even though her practice had kept her home in New York.

Curiously enough, Enrique had always tended to neglect his own health. When the cholera epidemic erupted, he had refused to be flown home with the majority of other delegates, staying on in India to lend what help he could. The first prognosis from the hospital where they had taken him had been favorable. But Victoria had had an ugly premonition. All her prayers had gone unanswered; her beloved had come home in a plain wooden casket.

The ensuing years of loneliness melted into a blur—long years of struggle and disappointment. She had carried on Enrique's great work, making a nuisance of herself by shouting his message into deaf political ears. But at last—not too late, perhaps; but *very* late—after the Mideast conflagration which all but destroyed Israel and placed the whole of Islam under Russia's thrall, she and the other criers-in-the-wilderness had at last been heard. After much panicking and pointing of fingers, the UN peace-keeping troops had been bolstered and united into a true international armed force. Then—could it be nearly twenty-five years ago?—UNDEP's Triage Committee had been formed. Dr. Duiño had been its first and only chairperson.

The old woman raised withered hands. There were times when she imagined she could see light streaming through the mottled parchment stretched over her bones. Where was pretty little Vicky Ortega now? Submerged in this twist of exhausted flesh, she supposed.

She rose with the aid of her bamboo cane and shuffled to the window. It was after midnight, and fairly clear. She looked up at the few visible stars for a time, then stood gazing far out over the inky wash of the Atlantic into the depths of night.

Two days later, a preliminary report arrived from the UN Intelligence Agents who were investigating the bogus birth-control tablets. The assistant manager of Gilbert's Pharmacy, thirty-third layer, twelfth sector, northwest quadrant of the gargantuan arcology complex where Monique and her husband lived, had recently applied for parenthood. Pressure was brought to bear—and a hint of amnesty if full

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cooperation were forthcoming. During the ensuing week, the trail led from the pharmacy to a disreputable retired chemist in Cleveland, to a thrice arrested though never convicted Philadelphia dealer in black market pharmaceuticals, to a drug wholesaler with shady connections in Trenton, and finally to the legman for a prominent Congressman. A second week passed before the UN Intelligence Director called Sra. Duiño and mentioned a name.

"Are you certain?" she asked, stiffening.

"No, madame. There's no way short of a trial to be certain, and I doubt whether the DA would indict upon the sort of evidence we've managed to gather."

"Are you yourself certain?"

"I . . . yes, madame. I myself am quite certain."

"Thank you for all your efforts," she said. "Please make sure your findings remain confidential."

Dr. Duiño snapped off the vidicom and sought her cane. She stumped from the office, startling Harold and three VIP's who were waiting to see her. She rode upward in the private lift, failed to acknowledge everyone who greeted her in the corridor, and spent the remaining afternoon hours closeted with her fellow Triage Committee members behind closed doors.

Late the following day, Victoria entered Bennett Rook's anteroom, breezing past his receptionist unannounced.

The inner office was crowded; Rook was at the chalkboard, running over some statistics with a group of underlings. He telescoped the collapsible pointer he had been using. "Dr. Duiño. To what do we owe this honor?"

"I must speak to you at once in private." She shooed them out with her cane, causing a concerted fumbling for notebooks and other papers. The UNDEP employees filed out, studiously avoiding one anothers' eyes.

When the door closed behind the last straggler, she said, "Is this room safe?"

"Quite safe, Victoria."

The old woman inspected Rook analytically. "Well, is it to be 'wroth in death, and envy after'? Or will you bargain?"

"Pardon me?"

"Come, come, Rook; bluffing was never your forte. If for some reason I should choose to step down," she said, speaking slowly, distinctly, "will you allow my granddaughter to bear her child in peace?"

"Why, certainly, Victoria. As I once told you, I'm not a hypocrite."

"No," she said, "merely a . . .!" She choked off the gutter term that came to her lips. "May I ask what I have done to you to deserve *this*?"

"Personalities aren't involved,"

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he said. "It's the job—the job you are *failing* to accomplish. You left me no choice."

The old woman swayed, leaning heavily on her cane. Rook moved as if to help her, but she fended him off, saying sharply, "Please keep your hands to yourself."

Settling herself in a chair, Victoria Duiño looked up at the man, her eyes bright. With measured intonation, she enumerated certain facts concerning an assistant pharmacy manager, a Cleveland chemist, a Philadelphia dealer in pharmaceuticals, a drug wholesaler, and a Congressman's stooge.

Rook was nonplused. "Thorough," he said smoothly. "You've been very thorough, as I anticipated. You realize, of course, that such 'evidence' would never hold up in court."

"No district attorney, judge, or jury will ever hear it."

"Then, how—?"

"Tomorrow morning," directed the old woman sternly, "you will personally arrange official parenthood sanction for my granddaughter and her husband. Spare me the seamy details of how the deed is to be accomplished."

"And . . . if I refuse?"

Victoria's smile was thin, totally lacking in humor—the smile of a canary who has successfully evaded the cat. "I visited with the other seven members of our committee yesterday, Rook. They all seemed quite eager to see things *my* way. Persist in your endeavor, and you will find yourself out on the street, looking in. Discovering another meal ticket might become a serious problem."

Bennett Rook took a moment to digest this information. "Then I suppose you have won," he said at last.

"Yes, I suppose so. As such things are reckoned."

"Do you blame me?" Rook sounded the injured party. "I'm not really an ogre, Victoria. You've lived long, worked hard; you've seen the world change into something ill and decrepit. Was it so despicable to try and force you to lay down your burden and rest?"

"It was," she said, "though I don't expect you to understand why. You are not a flesh and blood creature, Rook; no juices of life flow within you. You are cold and rational—both a superb asset, and a potentially terrible liability to triage activities."

"I'll make the necessary arrangements tomorrow," he said.

Victoria Duiño nodded. "Good. Now that we understand one another, I have a bombshell for you: the Matriarch of Death has at last decided to abdicate. Not, however, because of your foolish blackmail scheme.

"You were correct, Rook: I am indeed old, feeble and used up. And tired—very tired. You strike at me through my grandchild; His Holiness attacks me through my

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faith; my name is anathema from Antarctica to Greenland, and all around the world."

"You've managed to amaze me, Victoria."

"Furthermore," she went on, disregarding his incredulous stare, "had you refrained from this silly coup, you might well have been elected Chairperson of the Triage Committee next week. As it is, while eminently qualified, you have proved yourself utterly unworthy."

"Bitter gall." Rook grimaced. "That does sting, Victoria. But don't count me out just yet. I—"

"Hear me, Bennett!" She twisted the cane savagely in her hands. "This will be our final encounter, and I intend to have the last word. I want to clarify something, now and forever; something you *must* comprehend.

"You have repeatedly condemned my triage philosophy as being too lenient, too soft. It is not. Triage is, and has always been, a concession to the inevitable, not premeditated mass-murder. Twenty-five years ago, in the white heat of a new crusade, we set a rather idealistic goal: semi-immediate reversal of runaway overpopulation. We were dismayed to find it not that simple. How can an illiterate Third Worlder, whose single recreation in an otherwise drab existence is sex, be persuaded to remain chaste during his wife's fertile period?

"But now, whether you care to acknowledge it or not, a dim glow brightens the far end of the tunnel. We faced cold facts, long ago, asking ourselves whether it would be wiser to disrupt every socioeconomic system on Earth by seeking a quick solution, or to wage a strategically paced, long-range war. The latter policy is saner, more practical, and far more humanitarian; the ultimate solution may lay farther in the future, but victory is also much more assured.

"I will not live to see even a partial victory; nor, in all likelihood will you, Rook. But my great-grandchild-to-be, whose strange godfather you are, might do so—*if* you and the others make the best possible use of the varied technological weapons we will someday have at our disposal: new bio-compatible pesticides, new hybridized grains, reclamation of desertlands, perhaps interplanetary migration.

"As in any war, we will face mini-triumphs and small setbacks, major victories and hideous defeats; we must bear up equally under good fortune and adversity alike. We must take what we have to take, and give what we have to give to re-create a world where my great-grandchild-to-be can enjoy a noble, cheerful life, a world where a gallon of potable water is not a unit of international exchange, where reusable containers are not an article of law, where food is abundant and air is fit to . . ."

Victoria broke off, shaking her

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head sadly. "I can see that I am wasting breath. Very well; if you choose to have your lesson the hard way, so be it. I wish you luck; you will need all you can get."

The old woman labored to rise. Though he dared not help her, Bennett Rook came forward half a step despite himself. She did not deign to look at him again, making her way slowly to the door, dignity pulled tightly about her like a cloak.

Her mind at peace, Victoria went to her quarters and phoned St. Patrick's Cathedral. She spent two minutes persuading the young priest who buffered all incoming calls that she was indeed who she said she was. Finally, he allowed her to speak to Cardinal Freneaux.

"Oh, Louis, I'm so glad; I was afraid you had already left the city. I called to invite you to have dinner with me."

"Delighted, my dear Victoria." He sounded pleased and surprised. "I had made other plans, but they can be changed."

"This is an occasion," she said. "A UNDEP news bulletin of some importance will be released tomorrow morning. I want you to be the first to know. May I come by for you in an hour, Louis?"

"Fine! That will be fine. I'll look forward to seeing you."

She dressed without haste—the black gown reserved for formal affairs—and slipped on a diamond bracelet Enrique had given her many years before. She had difficulty fastening the clasp of an emerald brooch at her neck.

When she was ready, she took up a large satin handbag, the fancy black cane with the ivory tip, and called down to the garage. The electric limousine and its driver, accompanied by omnipresent UN Security Agents, were waiting for her outside the tower's staff entrance.

They rode in silence, with the windows rolled up despite the muggy summer evening. With keen interest, Victoria watched the defeated multitudes overspilling the sidewalks; four hours, and more, remained until the midnight curfew. They crawled west through dense traffic on East 48th Street, turning right at Fifth Avenue.

When the limousine nosed its way into an enormous queue of hungry supplicants gathered outside St. Patrick's Cathedral, Dr. Victoria Maria-Luisa Ortega de Duiño crossed herself. ■

Guest Editorial,

continued from page 12

as to wave a caution light. If the funds are not repaid to the Federal Reserve, then that organization will either reimburse itself by drawing upon the banks (thus reducing private investment by a corresponding amount) or by the creation of new money by manipulating the supply of reserves. The latter obviously reduces the value of all existing

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money. So if the funds are not repaid to the Federal Reserve, either total investment is unchanged (private down, public up) or the value of the dollar drops and steals away some of the value of the dividends.

If the investment funds *are* repaid to the Federal Reserve, they can only be obtained by deducting them from profits—in which case there will be too few profits to make a difference to each citizen's way of life. I further pointed out that the normal process of rising private investment in industry, if not discouraged, would lead to at least a doubling of total investment by the year 2000, one of Mr. Albus's goals.

Trying as hard as I can not to sound like Barry Goldwater, I must repeat that "profits," dirty as are the connotations of the word, do not and cannot be paid to investors or to anyone else. The first slice off the top is for taxation. This is mainly Federal, but except where unusual loopholes exist, amounts to roughly half the net income after expenses. Mr. Albus said this would probably be eliminated to leave more available for dividends. Now, where would the government obtain funds to make up for the loss of the corporate income tax? Where but by increasing the *personal* income tax? There go much of the dividends. (I will ignore the possibility that the government would *not* replace the lost income—that it would merely get by on less. Anyone who wants to take that one seriously will have to spell out exactly what he would eliminate.)

The next slice is for depreciation—the funds reserved by any company to replace equipment or assets as these are worn out or used up. These might be called internal investment, and in many cases well exceed the funds put into the business from outside by investors. They are absolutely necessary to the well-being of the business, but Mr. Albus would discontinue them in order to keep dividends high.

He conceded that *if* they were found to be necessary, the proposed big public investment agency would provide them, along with the usual external investment. Again we have a case of casually calling for billions of dollars out of nowhere, without the understanding that there are consequences to manipulating the currency.

I think the main problem in such proposals is that few people know what most "money" is. Most of it is not physical at all, really a series of invisible tracks on a computer tape or disc. When the Federal government runs a deficit, it borrows some by selling bonds to you and me, but mainly it obtains bookkeeping entries in the Federal Reserve by the appropriate movement of promises to pay given rates of interest. At a stroke of a key, the Federal government is credited with certain billions of dollars, against which it can draw salary

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checks. It uses the Federal Reserve as the mechanism for extracting funds from the private sector (through the banks) *or* as the mechanism for creating new funds. The first reduces private investment; the second brings on inflation.

Much of the Federal debt is held by its own agencies, but there is no need to go into detail here. I need only say that when one holds the promise of an agency to pay another agency and discovers the first promise is based on anticipated promises of others, one either trembles or learns to live on faith!

One of the biggest problems I had with the proposals of Mr. Albus was not economic, but political. His proposed new public investment company would be headed by elected people who would make decisions based on everyone's long-range welfare, not like the usual politicians and business people. I questioned where such superior types would come from, as it is a quite strong temptation (see the pages of any history book) to preserve one's office and power by sacrificing the long range in order to look good to the electorate today. And if these economic rulers were to be chosen by public election, who but the usual politicians would be elected? There is no easy way out; if we are to improve our economic lot, we have to do it with the kind of people we now elect to office. Once this is accepted, we see there is no value in creating a more complicated economic structure; if wealth is to be increased and distributed more equitably, it will have to be done through people as they are, not as we wish them to be.

Such complications can lead one to either distrust and complete skepticism, or the urge to play games. Games are a lot of fun but I fervently hope no one who really has economic power will confuse reality with fun. The long-range solution to much of this is for the educated person to add economics to the areas in which he can talk intelligently, and understand public discourse. I'd advise reading people like Robert Heilbroner, and that you spread around your ideological exposure by taking a look at Milton Friedman, John Kenneth Galbraith, Eliot Janeway, and Paul Samuelson.

There are many excellent books available today on economics itself and on its relations to politics. My hope is that SF readers will demand a higher degree of economic sophistication from their authors, just as few would today put up with a story that displayed a basic ignorance of physics. We will each mold our beliefs variously, but if they are based on reality, we will have something to discuss. By the way, my own economic philosophy can be summarized quickly by TANSTAAFL. If this be heresy, make the most of it. ■

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Editor's Note: Lester del Rey would never review one of his own books in this column. He won't even review novels that have been serialized in Analog! But he has produced a book of such intense interest to Analog's readers—old and new—that the Editor has usurped the column this month, to devote it to THE BEST OF JOHN W. CAMPBELL, edited by Lester del Rey (Science Fiction Book Club, $2.49; Ballantine Books, $1.95). The following "review" is reprinted from the Introduction to the book, so you are getting del Rey's own words—about a book he never intended to review! Incidentally, the book ends with a Postscriptum by Mrs. Campbell, who provides a warmly human insight into who made this magazine, and science fiction in general, what it is today.

The Three Careers of John W. Campbell

Back in the very early days of science fiction, everyone knew it was impossible to make a living in the field. There were only two SF magazines being published, each paying somewhere around $200 for a long novel and perhaps $25 for an unusually good short story. Even when a story was accepted, a writer might have to wait months after publication before he was finally paid for his work. Furthermore, no science fiction *books* were being published; so once a story appeared in a magazine, there would be no further income from it.

Writing science fiction was a hobby, not a career, and nobody questioned that obvious fact—nobody but John W. Campbell! Against all logic, he not only determined to make science fiction his life's work, but he succeeded. It took three careers to achieve his goal, during which he became almost single-handedly the creator of modern science fiction. And eventually, others with less genius or less folly found it possible to follow the trail he blazed.

Campbell's first sale was made while he was still in college, studying for his science degree.

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(Later, he used to joke about it, saying that he only graduated because his English professor couldn't flunk anyone who was already selling to a professional magazine.) It appeared in January 1930, six months before his twentieth birthday. Within a year, he had become one of the best-liked writers in the field.

In those days, the science fiction stories had almost no literary value. They were crudely written, at best, and there was little attempt at characterization. The people were merely used as props to discuss the heavy use of superscience and to make the simple plots work. The important things in science fiction were the wonders of future science and the unlimited possibility for human progress. The best-liked stories dealt with adventures far out in space, where men discovered other somewhat human races and warred mightily with evil invaders of monstrous form.

Campbell took the formula and carried it to its ultimate. His science began at the far edge of current theories and went on from there at breakneck pace. By the end of 1934 he had written six novels, most of which are still being published to the delight of new young readers. In these novels, his heroes roamed all space and beyond into other universes. New inventions seemed to be created on every page. In the end, his heroes could even create entire universes just by "thinking" into their ultimate machines.

I have included in this volume only one short story from this period: "The Last Evolution." (The stories are arranged in chronological order, except for related stories that appear together; hence this early story is the first in the book.) It shows all the crudity and lack of characterization of the period. But it also shows the scope of Campbell's imagination and his originality. As far as I know, this is the first story ever to deal with robots as more than complex tools or slaves for human convenience. It would be another ten years or more before other writers could accept Campbell's concept of possible evolution.

By the end of 1934, however, Campbell had used up almost every possibility to be found in the old formula. He wrote a few "John W. Campbell" stories after that, but the enthusiasm was gone. He could have gone on repeating himself, since his stories were still as popular as ever, but he was never content to be a follower—even of himself.

In fact, he had already entered upon a second career. A couple of years before, he had been deeply impressed by the

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first chapter of *The Red Gods Call*, by C. E. Scoggins, a popular adventure writer of the time. Although the rest of that book was straight adventure, that first chapter had mood, feeling, and everything that science fiction seemed to lack at the time. Campbell decided to do something about that lack.

It's hard to be sure, but Campbell's early work does not indicate that he was a naturally gifted writer in the usual sense. But he could learn—no man was ever a better learner! So he set about mastering the ability to write science fiction as it had never been done; and because the story turned out to be unlike anything else he had written, he chose to publish it under the pen name of Don A. Stuart. Thus his "Stuart" career began before his "Campbell" one was ending.

The result was "Twilight," a story that was chosen in 1970 by the Science Fiction Writers of America as one of the great classics of the literature. However, the story was hardly an instant success. Every editor in the field turned it down, until F. Orlin Tremaine became editor of *Astounding Stories*. It finally appeared in the November 1934 issue, when the readers gave it almost unanimous praise and demanded more from this "new" writer. (For more than a year, the true identity of the writer was kept absolutely secret.) By the end of 1935, Stuart was even more popular than John Campbell had been.

Stuart, as Campbell later put it, was an annoying kind of writer. He refused to take the standard axioms for granted. When everyone knew that something was so, Stuart began questioning it. Every science fiction reader wished for a day when machines would make everything easy for everybody; that would be utopia, of course. So Stuart wrote "The Machine" to show how things might really be.

One of the standard horrors of science fiction was the idea of an invading race taking over Earth. Stuart took a good look at that in "The Invaders." But suppose the invaders made slaves of the people of Earth; everyone knew that slavery was the worst thing that could happen to people. Well, maybe; Stuart decided to examine that proposition and see just what was the worst that could happen to whom. This story was entitled "Rebellion."

These three stories were planned together under the general title of "The Teachers," though that was never actually used for them. But one way or another, they all have the common theme of someone teaching a lesson to someone else, though just what the results might be wasn't as certain as it might seem.

"Blindness" is a strange examination of the idea that the discovery of simple, cheap, atomic fusion power would be the

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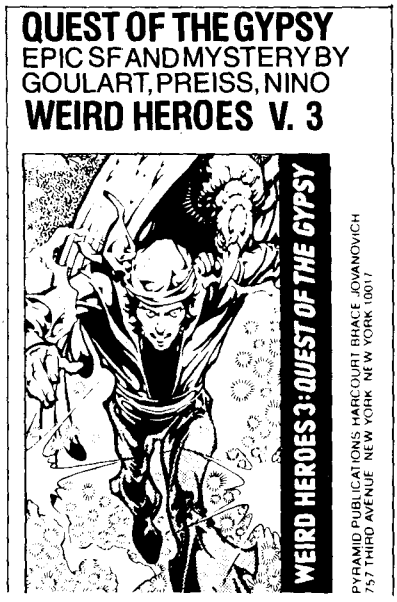
greatest of boons to the human race. It is also a moving story of a man who makes a tremendous sacrifice for science—and what his reward may be. And "Elimination" looks at man's ancient wish dream to know what the future may bring.

Campbell, as Stuart, was leading science fiction away from the old, accepted dreams of science fiction. He was blazing the way toward a time when a writer must look at every postulate and examine it as if it were a new idea. But he was doing far more. He never forgot that he had begun by trying to give the feeling and humanity to his stories that had been lacking. More than his ideas, the quality of his writing excited all who read them.

Perhaps this is best shown in "Forgetfulness." On the surface, this story is a bit like "The Invaders"—an alien race comes to Earth to find mankind living a simple, pastoral, almost-childlike life, surrounded by the remnants of a magnificent civilization it has forgotten. It's all handled simply, directly, and with a feeling on the part of the alien that the reader can share. Then at the end—Well, read it for yourself. For over thirty years, that story has remained in my mind one of the high points of all science fiction.

"Out of Night" and "Cloak of Aesir" really go together to make up a short novel. Again Campbell gives us aliens and struggling humans—but there is no simple right and wrong, no obvious warfare, no previously overused cliché situation. And at the end, as one sits with the Sarn Mother, it is the emotional resolution that remains, not the simple chain of events.

"Who Goes There?" is a suspense story, something neither Campbell nor his alter ego, Stuart, had tried before. It is the story from which the movie *The Thing* (later called *The Thing from Outer Space*) was supposedly made. But the movie was just another monster epic, totally lacking in the force and tension of the original story. "Who Goes There?" was chosen by the Science Fiction Writers of America as first among the greatest novellas of all time.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WEIRD HEROES 3: QUEST OF THE GYPSY
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In only ten years, John Campbell had become two of the greatest writers of science fiction. And then (except for one short fantasy novel written to fill a magazine he edited) both careers came to an end, as he began a third which was to be even more influential than any amount of writing could have been—so influential, indeed, that a crater on Mars has now been named *Campbell* to honor him.

Toward the end of 1937, he was asked to be the editor of *Astounding Stories* (soon to be renamed *Astounding Science Fiction* and later *Analog Science Fact/Fiction*). He continued as its editor for thirty-four years, until his death in 1971. As a writer under either pen name, Campbell had been one of the best; but as an editor, he quickly became *the* greatest. If that is a personal judgment, it is one shared by most writers and editors in the field.

When he took over as editor, the magazine had settled into a dull routine; and other magazines were folding or turning to blood-and-thunder stories. Old authors were leaving the field and few new ones of any talent were coming in. There seemed no hope that science fiction would ever become a generally accepted category.

Campbell rapidly changed all that. He had a clear vision of what science fiction should become, and he began teaching that vision to all the established writers capable of learning it. He also discovered a host of new writers within the first few years of his editorship. Most of the leading science fiction writers today are ones he discovered and trained: Asimov, de Camp, Heinlein, Sturgeon, Van Vogt, and many others.

Writers were developed, too, not merely discovered. Faulty stories went back with pages of detailed criticism of plot and technique that meant more than any dozen courses in how to write. Ideas for stories poured out from Campbell to his writers, and many of the best-loved stories in the field came from those ideas. He had the marvelous talent of suggesting just the right idea to a writer and putting it into a form that writer could best handle.

In my own case, he repeatedly forced me to continue writing when I would normally have turned to other things; and he supplied the ideas for many of my best works. Most writers I know had the same experience. Even when a story was not right for him, Campbell was generous with his help in improving it for submission elsewhere. The result was the so-called Golden Age of science fiction—the beginning of modern science fiction, which was capable of reaching beyond a small readership of gadget-loving hobbyists and science buffs. When the book publishers finally began turning to this new category for material, it was only because there was already a body of respectable novels

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waiting in the back issues of *Astounding*. Even today, a rather large percentage of the most successful books are still produced by the writers Campbell discovered. Without him, the current acceptance of science fiction would almost certainly have been impossible.

To my surprise, many of the writers and fans seemed to consider Campbell a hard man to know well. He was held in some awe and in a measure of affection; but most people complained that he lectured at them, rather than talking to them. This was probably true in many cases. Campbell was somewhat shy, particularly about his personal feelings; and he hated to make conversation, something most people do automatically to fill time. He had no fund of small talk. He was a man passionately in love with ideas, who wanted to chase such ideas back to their beginnings and forward to the furthest possible extension. To him, that meant an all-out, no-holds-barred argument.

His mind was like a rapier, darting out instantly to find any unprotected spot in an opponent's thinking. He was a quick master of the fundamentals of any area of knowledge and he came armed with an amazing fund of information. Apparently he was intimidating to many. But to those who would return his passionate love of argument as mental exercise, he was a wonderful human being. And his delight was as great in losing an argument as in winning. Over the years there were many areas where he and I remained in total opposition. His eternal quest for undiscovered fields of knowledge led him into what I considered cultist beliefs, and I fought against those both privately and publicly. But our clash of ideological attitudes didn't matter. I always found him a warm and generous friend, whose loyalty was unshakable.

His editorials in the magazine were always a source of controversy, as he meant them to be. He was using his editorial page to stir up thinking, to say, "Yes, but how do you know your obvious truth is so darned obvious? Now let's try a different assumption." He refused to accept any set idea of what might be good or bad. And some of his writings on politics or on our current mores infuriated a great many readers. But other editorials were more future-oriented. And there he was always in advance of his writers.

I've included only one editorial. (For those who want to see how controversial he could be, there's a whole book of his editorials in print.) This was written in 1960, when we were just fumbling our way out into space. "Space for Industry" is fifteen years old now, but it's still probably a hundred years ahead of progress. In any career, John W. Campbell was always ahead of his time.

—Lester del Rey

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A Calendar of Upcoming Events

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October 19-21, 1976:
U.S. Computer Chess Championship (ACM), at Houston, Tex. Info: Monroe Newborn, School of Computer Science, McGill University, Montreal, P.Q. H3C 3G1.

October 29-31, 1976:
Second WORLD FANTASY CONVENTION at Statler Hilton Hotel, New York, N.Y. Guests of Honor—Michael Moorcock and C. L. Moore; Toastmaster—Gahan Wilson. Attending membership—$21.60 (limited to 750 persons). Info: Second World Fantasy Con, Box 379, New York, N.Y. 10008. Include SASE.

November 5-7, 1976:
TUSCON IV (Arizona regional SF conference) at Sands Motor Hotel Tucson, Ariz. Guest of Honor—Theodore Sturgeon. Registration: $4 until October 31, $5 thereafter. Supermembership $10. Info: Tuscon IV, Box 49196, Tucson, AZ 85717.

November 5-7, 1976:
ICON, Carousel Inn, Iowa City, Iowa. GoH: Frank Herbert; Fan GoH: Mike Glicksohn. $5 now, $7 at door. Info: Mark Moore, 421 S. Capitol, Iowa City, Iowa 52240

November 10-13, 1976:
Engineering in Medicine and Biology at Boston, Mass. (IEEE). Info: AEMB, Suite 1350, 5454 Wisconsin Avenue, Chevy Chase, MD 20015.

September 2-5, 1976:
SUNCON (35th WORLD SCIENCE FICTION CONVENTION)—at Hotel Fontainebleau, Miami Beach, Fla. Guest of Honor—Jack Williamson; Fan Guest of Honor—Bob Madle; Toastmaster—Robert Silverberg. Panels, talks, Masquerade, films, Art Show, Presentation of the Science Fiction Achievement Awards (Hugos) and the John W. Campbell Award for Best New Writer. Registration $15 attending, $7.50 supporting until January 1, 1977. Info: Suncon, Box 3427, Cherry Hill, NJ 08034.

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BRASS TACKS

Correction: *The last sentence of Gary Olhoeft's letter in the September issue should read: "Such materials do exist."—Ed.*

Dear Mr. Bova,

It's perhaps a flaw in my mental processes that I am unable to formulate a reasonably intelligent question at a specific time when it is necessary. Usually some incoherent gibberish is muttered confusing the speaker and, therefore, he is unable to respond adequately. Such was the case at the annual AAAS meeting in Boston (February 1976). I asked Dr. Carl Sagan if we should perhaps increase public awareness as to the need for expanded space exploration for the purposes of technological, scientific, and industrial developments. He responded that this was irrelevant to the ETI session.

However, during my long wait for the subway car's arrival, I reformulated my question and expanded it into one of sufficient urgency. What would be the circumstances which would possibly prompt public opinion to reach such high anti-scientific moods as to lend itself to substantial public destruction of scientific and astronomical equipment? The answer was simply: the discovery of an intelligent communications signal from a nearby galaxy.

My conclusion was based upon the judgment that as scientific and technological advances became so overwhelmingly complex and beyond the average person's capability to understand, that people would inadvertently begin to fear them. Then, when an intelligent extraterrestrial signal was detected and confirmed, religious leaders would proclaim that this was either a message from God (unlikely), or that it was an evil omen from the Devil because such a signal would conflict with Biblical interpretation and could be one of the Devil's tricks to turn people from God. Therefore, destroy all that is associated with the perpetration of this evil. Etc . . .

It sounds a little farfetched, perhaps, but a possibility.

CHESTER TWAROG
102 Derby Street
Salem, Mass. 01970

A far more likely possibility is the reframing of most religious ideologies to encompass the new information. Just as the Jews expanded their concept of Yahweh

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to include the irrefutable fact of the Babylonian captivity, existing planet-bound religious beliefs will expand to include non-human aliens. Or they will die.

Dear Mr. Bova,

I want to congratulate you as editor and L. Sprague de Camp as writer for the excellent "Breeds of Man." It was a fair and reasoned approach to a complex issue and it would be good if the scientific and intellectual community at large could read it and take it to heart. There are, however, a number of points which could stand some comment . . .

(One) point, rather minor, is that the Polynesians are often considered to be rather 'pure' bred Indo-Mediterranean caucasoid. These are the same stock from which the Basques and Picts (pre-'Erik's) supposedly arose.

The original blondish 'Erik's were part of the Indo-European heartland peoples in the Russian birch forest/steppe land. Their migrations were not, in all probability, relatively minor "fractions." One has only to recall the hundreds of thousands of Helvetii and Germans during the late Roman Republic or the massive march of the Zulus into South Africa to see examples of what primitive migrations really meant in terms of numbers. Without previously formed states the effects of these relatively huge masses were tremendous. There would be little cohesiveness in the native population.

The last point I want to make is this—another interpretation remains for the Japanese I.Q. statistics. Darwinian evolution demands that those individuals who best meet the environment will contribute more to the gene pool than those less happily endowed. What is often overlooked is this—the environment includes cultural factors. As people build a culture their creation is molding their descendents. One can easily postulate that intelligent and aggressive Eta were weeded out by the Ippan society either by rising out of Eta status or by dying. Japanese society is such that those who were under stress—as an intelligent Eta would be—were 'taken care of'. The genes are sifted out of the Eta pool just as equivalent genes were sifted out of the ancestral stock which gave us our domesticated animals. Those 15 points can be genetic! Unfortunately the same argument holds true for the American black population. Old records show that very few members from tribes known to be aggressive made it to the New World or lived long once they made it. The Portuguese, Spanish and English didn't tolerate manful revolt or disrespect of slaves 'too smart for their own good'.

The above *may not* have been at work. The all-environment people *may* be right. Let's find out! False knowledge is more

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dangerous than no knowledge. As far as bigots go—a man is what he (or she) is and not a figure on a graph.

BILL MARCH
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Ft. Lauderdale, Fla. 33309

It seems far more likely that the 15-point differential would be due to poor diet than to inherent genetic inequality. The effects of chronic undernutrition, from the womb onward, are known to impair learning abilities.

Dear Mr. de Camp,

Your article "The Breeds of Man" makes more sense and says more things well than almost any other I've read in months. It's good, damn good. Congratulations!

What particularly interested me was your cogent analysis of the Eta in Japan. Despite having spent many months in that country during the early days of the occupation, I barely heard of the group at that time. I learned to speak Japanese from an excellent, very cultured Japanese businessman who was working as an interpreter in those dark days. My friend Kurihara-san was so elegant he even wore spats! But I recall one time when he was very reluctant to give instructions to our company KP pusher (I was a company commander then), and he informed me that Yamada-gun (note the derogatory verbal distinction in form of address) was an Eta. All I could get from Kurihara was that an Eta was some form of untouchable and that he didn't even want to talk about it. And I couldn't explore the subject further.

I hope that your suggestion of further investigation of alleged genotypic intelligence differences will soon be carried out with the Untouchables and the Brazilian Negroid domination of the mixed Negroid-Caucasoid population.

This observation raises one more question. Throughout history, as you indicate, one of the most "ghettoized" ethnic minorities has been the Jews. Is this historic social discrimination against Jews reflected in intelligence scores shown by standard tests, as might be suspected if one reasoned from the Eta and American Negro examples? The obvious answer is probably not. And if not, why not? Perhaps the answer here might be found in the richness of home and community life within the Jewish ghetto. And this in turn might lead us to some further conjectures about the importance of a full, rich, warm, cultural environment to any ethnic group.

DR. WILLIS E. MCNELLY
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Could it be that the Jews have consistently clung to their own culture, language, religion and mores, rather than tried to assimilate themselves into the surrounding society?

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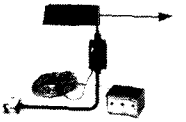

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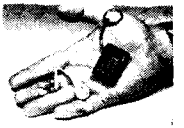

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